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THE INTEGRATED DISBURSING AND ACCOUNTING FINANCIAL MANAGEMENT SYSTEM (IDAFMS): AN OVERVIEW OF THE SYSTEM, ITS IMPLEMENTATION, AND THE EMPLOYMENT OF MICROCOMPUTERS IN SUPPORT OF IDAFMS

by

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capabilities and the enhanced control it brings to Navy financial managers are reviewed in detail. The employment of microcomputers by Navy financial managers and as an integral component of IDAFMS is investigated. Opportunities for employment of microcomputers in training applications and the considerations for computer based instruction are discussed. The Installation and Implementation Plans for IDAFMS are analyxed, particularly with respect to implementation training. Recommendations are offered to enhance IDAFMS training programs and implementation plans.

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ABBREVIATIONS AND ACRONYMS

AAA	Authorization Accounting Activity
ADPE	Automatic Data Processing Equipment
CAI	Computer Assisted Instruction
CAM	Claimant Accounting Module
CBI	Computer Based Instruction
CDA	Central Design Agency
CERPS	Centralized Expenditure/Reimbursement Processing System
CINCLANTFLT	Commander in Chief, Atlantic Fleet
CINCPACFLT	Commander in Chief, Pacific Fleet
CNAVRES	Chief of Naval Reserve
CNET	Chief of Naval Education and Training
COMNAVFACENGCOM	Commander, Naval Facilities Engineering Command
COMNAVSUPSYSCOM	Commander, Naval Supply Systems Command
CRT	Cathode Ray Tube
DBMS	Data Base Management System
DCA	Defense Communications Agency
DDN	Defense Data Network
DOD	Department of Defense
DPC	NAVCOMPT Data Processing Center
EL	Expense Limitation
EOB	Expense Operating Budget

FAA	Fund Administering Activity
FAADCLANT	Fleet Accounting and Disbursing Center, Atlantic
FAADCPAC	Fleet Accounting and Disbursing Center, Pacific
FD	Functional Description
FIPC	Financial Information Processing Center
FMIP	Financial Management Improvement Plan
FRS	Financial Reporting System
GAO	General Accounting Office
IDA	Integrated Disbursing and Accounting
IDAFIPS	Integrated Disbursing and Accounting Financial Information Processing System
IDAFMS	Integrated Disbursing and Accounting Financial Management System
IDAFMS OPFORCES	Integrated Disbursing and Accounting Financial Management System for the Operating Forces
I/IP	Installation and Implementation Plan
MIISA	Management Information and Instructional Systems Activity
MISIL	Management Information System for International Logistics
NAFC	Navy Accounting and Finance Center
NAVCOMPT	Comptroller of the Navy
NAVCOMPTSSA	Navy Comptroller Standard Systems Activity
NAVSCIPS	Navy Standard Civilian Payroll System
NCB	Director, Office of Budget and Reports

NCF	Commander, Navy Accounting and Finance Center
NETFMS	Navy Education and Training Financial Management System
NTP	Navy Training Plan
OMB	Office of Management and Budget
O&M,N	Operation and Maintenance, Navy
O&M,NR	Operation and Maintenance, Naval Reserve
OPTAR	Operating Target
RBT	Remote Batch Terminal
RDT&E	Research, Development, Test and Evaluation
SDT	Systems Demonstration Test
SECNAV	Secretary of the Navy
STARS	Standard Reporting and Accounting System
UAG	Users Advisory Group
UMR	Uniform Management Report

I. INTRODUCTION

A. BACKGROUND

One of the major concerns of every Navy manager is the control of those resources provided to accomplish the unit's mission. Whereas managers in the private sector attempt to maximize profits, those in the public sector attempt to maximize the benefits received for a given level of resource expenditure. An activity's ability to perform its mission effectively is judged to a large degree by the financial and non-financial data reported through its accounting systems; thus every activity commander has a direct interest in the efficiency and effectiveness of the accounting system(s) serving that activity.

Present Navy accounting systems have their roots in the Budget and Accounting Act of 1921 which, among other actions, established the General Accounting Office (GAO) headed by the Comptroller General of the United States. The Comptroller General is given the responsibility for development of standards for governmental accounting systems and subsequent approval of designs submitted by agencies. He is given authority to make expenditure analysis; maintain ledger accounts; investigate receipt, disbursement, and application of public funds; examine books, documents, papers, and records of financial transactions; and perform

audits as necessary. [1:14] All Navy accounting and disbursing systems are subject to GAO review. Recent GAO decertification of several systems (primarily the Navy's Joint Uniform Military Pay System) has prompted a renewed emphasis on compliance with GAO standards for federal accounting, disbursing, and financial reporting systems.

Two historical factors have contributed significantly to the relatively poor state of many Navy financial management systems. These factors are certainly not the only reasons for GAO decertifications, but each has contributed to many of the problems which plague Navy financial managers at both the activity and headquarters level. The first factor concerns a dual reporting system for accounting data and its associated invoice payment (disbursement) data. The second factor arises from the growth and expansion of automated financial management systems during the 1960's.

With the rapid build-up of naval forces during World War II, contractors needed to receive prompt payment for goods and services provided to the government so that their working capital would not be depleted and they could begin new contractual work. When the existing accounting methodology bogged down under a flood of contractor invoices, the Secretary of the Navy ordered that invoices would be certified for payment and the actual disbursement of funds would precede the accounting procedures for the

payment. [1:16] A dual reporting system was thus initiated and has continued in existence to the present. Figure 1 illustrates this dual system as it has existed for many years. The major problem inherent in such a system is the requirement to reconcile payments made and reported through one avenue with accounting records established and reported through another avenue. The net result is that many payments can never be reconciled with an activity's accounting records.

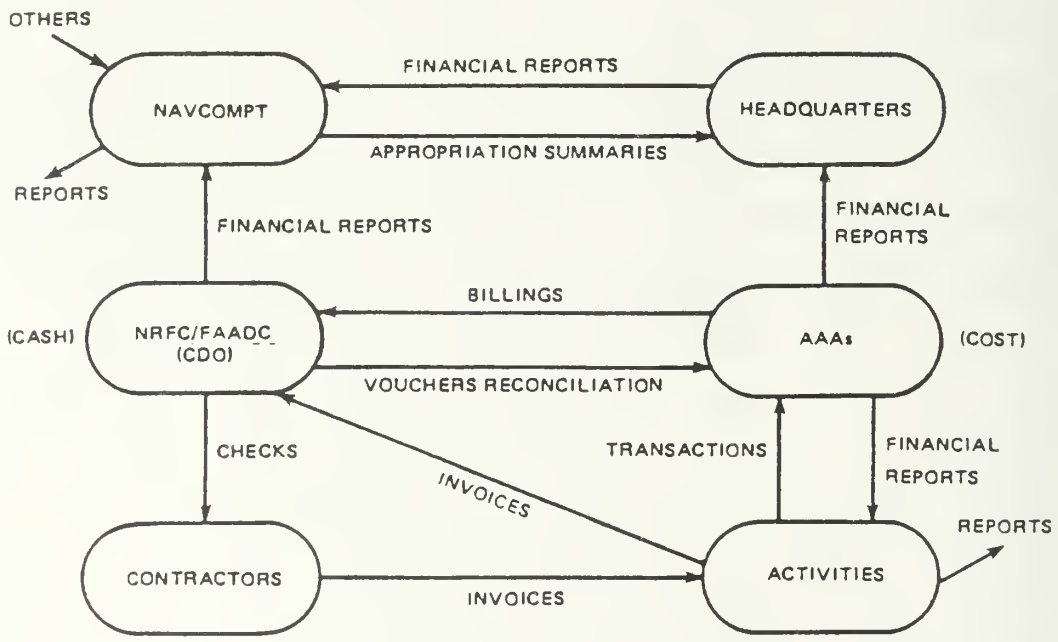

Figure 1
Traditional Financial Data Flow

As the Navy grew in size and complexity during the 1960's, increasing needs existed for financial control systems to aid in managing various types of funds. Out of this necessity grew numerous accounting and disbursing systems uniquely applicable to the mission performed by a given type of unit, the informational needs of its managers, and the reporting requirements levied by higher authority. In addition to the cost of maintaining and updating numerous systems with duplicate capabilities, considerable maintenance of memorandum records was required at activities which did not produce their own official accounting reports. These local records were needed because the production of accounting reports at the Authorization Accounting Activity (AAA) was a slow process, and frequent delays in processing were encountered. Memorandum records thus became the primary source of information for local activity financial management. Some method was needed to speed the collection and dissemination of financial information to its users at all levels in the financial reporting chain.

In response to the recognized necessity for improvement in its financial management systems, the Navy contracted the management consulting firm of Haskins and Sells to undertake a study of existing accounting and disbursing systems in use and to recommend actions to improve both

accuracy and timeliness of financial reports. Haskins and Sells' report, published in 1970, recommended the integration of disbursing and accounting systems utilizing a single data base and telecommunication capabilities to transmit data throughout the financial reporting network. [2:2] Under the proposed concept shown in Figure 2, all data concerning accounting for and disbursement of funds could be maintained in a single data base, and update of the data base would be driven by transactions entering the system from various sources. The processing activities shown at the center of Figure 2 are known as Financial Information Processing Centers (FIPCs).

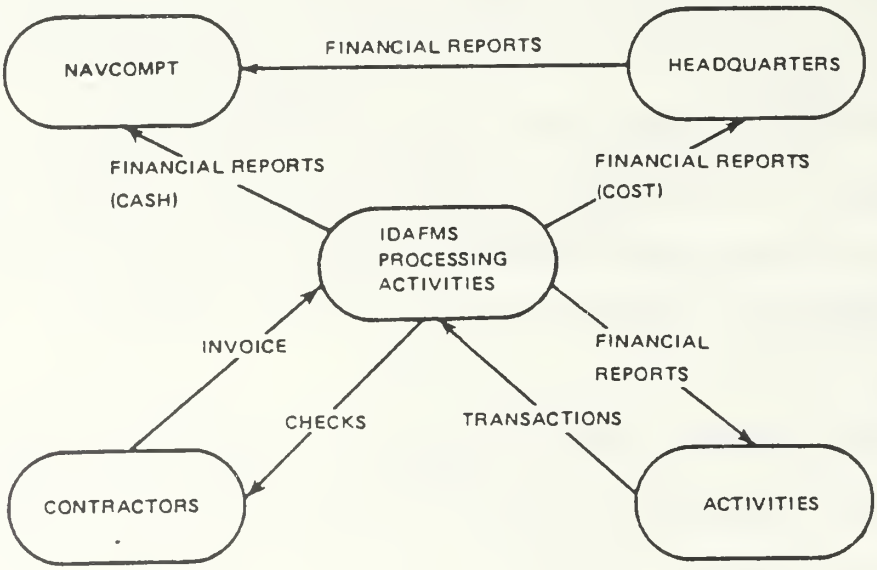

Figure 2
Data Flow Under IDA Concept

By employing an integrated data base with telecommunications capabilities, the following objectives could be realized:

1. Financial systems could be standardized to a significant degree.

2. The necessity to maintain memorandum records could be theoretically eliminated.

3. Dual accounting and disbursement reporting could be performed from a single data source, thus eliminating the need to reconcile data in reports generated from separate data bases.

4. The voluminous amount of hard copy document flow generated by existing systems could be greatly reduced.

5. Reports could be produced and forwarded up the reporting chain in a much more timely manner.

After review and analysis of Haskins and Sells' report, the Secretary of the Navy (SECNAV) established the Department of the Navy Financial Management Improvement Plan in 1972. The plan's purpose was to correct deficiencies in Navy accounting systems identified in various internal and external audits and to provide financial data which could better serve the needs of Navy managers. The long range objectives of the plan included integration of financial management, programming/budgeting, and accounting/reporting systems through the use of common data bases. SECNAV directed the Comptroller of the Navy (NAVCOMPT) to design, develop, and implement a Navy-wide integrated accounting system and a procurement accounting and reporting system. [3:1-1]

The advantage of employing integrated data bases throughout Navy financial systems rests largely in the concept of utilizing a single source of data from which all reports are produced. After establishment of the obligation (the initial record for a given resource expenditure) by the responsible command known as the Fund Administering Activity (FAA), all subsequent data affecting that record can be entered by the activity where subsequent transactions occur. Several different activities having separate responsibilities for a given record (i.e., procurement, receipt, invoice payment, and accounting) can provide data concerning that record to a single data base which can be accessed by all system users. Reports provided from data contained in the integrated data base would reflect the latest information provided by any activity having cognizance over a given transaction to a record and would report the identical information to all users. There is no necessity for reconciliation between reports, since all reports are produced from the same data base.

As an initial step in developing integrated data bases within existing Navy financial systems, NAVCOMPT authorized developmental efforts which resulted in prototype systems in several major claimancies including the Chief of Naval Material, Naval Facilities Engineering Command, Naval Supply Systems Command, Chief of Naval Education and

Training, and Chief of Naval Reserve. Each of these prototype systems produced extensive information concerning the development and implementation of an Integrated Disbursing and Accounting (IDA) system. It should be noted that the initial IDA concept did not encompass the entire Navy; it was intended only for activities operating under NAVSO P-3006-1, Financial Management of Resources, Operation and Maintenance (Shore Activities), the publication which specifies financial management, accounting, and reporting procedures for most shore commands.

The primary lessons learned from development and implementation of the prototype systems were centered in four areas.

- There is an increasing degree of complexity in design and software development for an integrated data base system. Conventional methods of developing systems for batch processing proved inadequate for the large number of related steps involved in creating more sophisticated systems.

- Precise planning and execution of the implementation process was recognized as a factor critical to the success of any system. Implementation procedures for the new systems varied significantly from those employed in previous systems.

- Training of personnel to operate the systems, particularly at the FAA, was largely an afterthought. A system's failure to produce desired results for its users could frequently be attributed to an inadequate pre-implementation training process.

- A similar pitfall of many systems was the lack of any post-implementation or follow-on training. New employees were required to learn on the job without benefit of formal instruction or standardized training materials. As a result, very few employees could

gain a thorough knowledge and understanding of an activity's system.

Personnel responsible for design and development of new or revised systems needed to consider each of these factors carefully if new systems were to avoid the difficulties encountered with previous systems.

B. PURPOSE OF RESEARCH

Given the factors noted above, this thesis will examine the planning, documentation, and methods currently being employed in the design, development, and implementation of the Integrated Disbursing and Accounting Financial Information Processing System (IDAFIPS), the Navy's newest and most sophisticated financial management system. The intent is to take an objective view of the activities currently underway and those planned for the implementation process. The research will focus on the training of personnel who interact with the system, particularly those at the FAA. A question to be addressed throughout the research is whether the training to be conducted both prior to and after implementation will meet the needs and desires of system users. Answers to this question can only be realized through analysis of the numerous factors considered by system designers when developing the methods and content of training programs to support the new system.

C. SCOPE OF RESEARCH

Considering the purpose of the research, IDAFIPS' major subsystem, the Integrated Disbursing and Accounting Financial Management System (IDAFMS), was selected for review. The considerations for employment of microcomputers in the training process will be explored and contrasted with currently planned methodology. Conclusions and recommendations arising from the research will be developed and discussed in the final chapter.

This thesis is intended to serve a variety of readers, depending largely upon the reader's background and expertise in Navy financial management systems. The novice reader should be able to obtain a fairly detailed understanding of IDAFIPS as a system and the functions performed in each of its subsystems from the background discussion contained in Chapter II. The reader should obtain an understanding and appreciation of the complexities of any standardized financial management system and the organization required to design, develop, and implement such a complex system.

Readers more knowledgeable in the basics of IDAFIPS can gain additional insight into the major subsystem selected for analysis, the Integrated Disbursing and Accounting Financial Management System (IDAFMS), in Chapter III. IDAFMS role as the foundation for IDAFIPS is discussed

briefly, followed by a detailed review of the system design methods employed in development of each IDAFIPS subsystem. IDAFMS processes performed by the application software are introduced at a macro level, and the data flow relationships between IDAFMS and the numerous other management information systems with which it interacts are reviewed. Chapter III concludes by focusing on control of resources at the FAA, also known as the operating budget holder. The provisions of IDAFMS which aid control at the FAA, current plans for providing a means to employ microcomputers at the FAA to analyze IDAFMS data, and the enhancement of resource control made possible through systems such as IDAFMS are discussed and analyzed.

Chapter IV contains an overview of the use of microcomputers in educational applications and the theoretical considerations for design of computer-based or computer-assisted instruction. This chapter should provide insight to the reader whose interests lie in the application of educational theory in an automated environment. The potential use of microcomputers in the IDAFMS training process is discussed and contrasted with training plans and proposals in existence at the time this thesis is written. The potential for microcomputer usage in IDAFMS applications is discussed along with factors which must be considered by both FAAs and project management if microcomputers

are to be utilized in support of IDAFMS. Alternative applications of microcomputers in the IDAFMS environment are introduced and discussed briefly.

The reader who has experienced the implementation of an automated financial management system or who may be supported by an activity which will convert to IDAFMS can identify with the complexity and the critical nature of the implementation plan. Chapter V will provide an overview of the IDAFMS Installation and Implementation Plan (I/IP) and the supporting Regional I/IP for the initial implementation at the Fleet Accounting and Disbursing Center, Atlantic (FAADCLANT), Norfolk, Virginia. The general plan for development of each regional data processing facility where the dedicated IDAFIPS hardware suite will be housed is discussed along with plans for conversion of present data files to the IDAFMS data base. The implementation training plan for personnel interacting with IDAFMS at both the FAA and the Financial Information Processing Center (FIPC) is discussed and evaluated. Chapter V concludes with an analysis of the critical factors which must be considered in the development and administration of an effective program to support implementation and follow-on training requirements for IDAFMS users.

Conclusions and recommendations arising from the research are provided in Chapter VI. The conclusions and

recommendations contained in this chapter and those found elsewhere in the thesis are those solely of the author and should not be interpreted as representing the official views or policies, either expressed or implied, of the Department of the Navy or any naval command referred to within this document.

D. RESEARCH APPROACH

The research phase of this thesis began with a definition of the problem to be studied and the scope of the research itself. A search of current literature concerning integrated data bases used in automated accounting systems was conducted. This search provided very limited data outside of sources in the Department of Defense. Extensive materials covering all aspects of IDAFIPS were obtained from Navy sources and reviewed thoroughly. Extensive interviews were conducted with personnel involved in all aspects of project development and implementation, including managers and supervisors of activities which will utilize the system after implementation.

IDAFIPS is a project unique to the Department of the Navy, although the concept of employing integrated data bases in automated financial management systems has been employed in other federal and state government agencies and in the private sector. A search of the Defense Logistics Studies Information Exchange data base revealed

very little published material outside of Navy sources concerning IDA concepts or applications within the Department of Defense (DOD). Consequently, research materials were primarily limited to publications, directives, manuals, informational bulletins, contractor produced reports, and briefing materials provided from sources associated with the IDAFIPS project. In certain cases, the final version of specific reports was not published prior to the writing phase of this thesis; reference to draft versions of reports are so stipulated in the list of references.

The primary source of data for this thesis was the NAVCOMPT IDA Project Office located at the Navy Accounting and Finance Center (NAFC-62) in Washington, D.C. Direct liaison was maintained with the IDA Project Officer and his staff throughout the research and writing phases. A research visit to the Project Office permitted extensive interviews with the Project Officer and key members of his supporting staff. The visit amplified the large volume of supporting materials previously provided and allowed further investigation of those factors which could not be addressed during frequent telephone communication.

The primary design, development, and testing of all IDAFIPS application software is being conducted by the Navy Comptroller Standard Systems Activity (NAVCOMPTSSA),

a NAVCOMPT field activity located in Pensacola, Florida. NAVCOMPTSSA is chartered as the Central Design Agency (CDA) for all NAVCOMPT-sponsored financial management and payroll systems. A significant amount of research material was provided by NAVCOMPTSSA's Appropriation Systems Department, whose responsibilities include the IDAFMS project. In addition to analysis of these written materials, a research visit to NAVCOMPTSSA facilitated interviews with the director of the Systems Design and Development Division and some key support personnel responsible for data conversion and implementation training. These interviews proved invaluable in gaining a more complete understanding of the functions performed by the CDA and the relationships between the project office and the CDA.

To assist in understanding the environment within which IDAFIPS will operate, research visits were conducted with the FIPC at the Naval Supply Center, Oakland, California, and with the Naval Education and Training FIPC at Pensacola, Florida. Additional discussions were held with key personnel from the FIPC at the Naval Supply Center, San Diego, California. These interviews provided a significant insight into day-to-day operations within the FIPC, the expectations that FIPC personnel have for IDAFIPS, the concerns over perceived deficiencies, and the limitations under which these FIPCs operate.

The ultimate user of the IDAFMS subsystem is the Fund Administrator, the Commanding Officer of the activity in receipt of an operating budget. All accounting input to and output from IDAFMS passes through the activity's Comptroller Department. As the primary users of IDAFMS, the activity's Comptroller, Budget Officer, and Accounting Officer rely totally on the system to process financial transactions correctly and to provide required reports and additional management information in a timely manner. Discussions were held throughout the research phase with personnel from several different FAAs in order to gain an appreciation of the environment within which IDAFMS will operate. Attendance at an IDAFMS structured analysis walk-through given for FAA personnel in San Diego, California facilitated a greater appreciation of the needs and desires of those personnel who will interface with the system, and the constraints facing the FAA financial manager.

Research for Chapter IV was confined largely to the Implementation and Implementation Plans (I/IPs) for IDAFMS and periodical literature concerning computer based instruction (CBI) and computer assisted instruction (CAI) theory, application, and developmental techniques. Although many different educational organizations, software developers, and management service companies are employing

CBI and CAI, non-proprietary literature concerning the theoretical basis of these techniques is very limited.

E. LIMITATIONS OF RESEARCH

As noted above, the research for this thesis has been primarily confined to publications, directives, policy statements, and reports produced by or under contract for the Department of the Navy. These materials have been provided almost totally by the IDA Project Office and by the Central Design Agency. Interviews with personnel involved at many levels of the project have served to meld the data into a more understandable form and have provided many viewpoints which would otherwise not have been obtainable. These opinions, desires, and concerns expressed have no doubt provided some degree of influence; nevertheless, the author will attempt to provide an objective view of the systems investigated.

The analysis presented in Chapters II through V is not intended to be exhaustive; numerous questions concerning IDAFIPS as a whole and IDAFMS as its primary subsystem may possibly remain unanswered. The limited amount of time available to conduct research and write this manuscript prevents a more thorough and exhaustive analysis. There remains a need for further study of this topical area, particularly concerning the employment of alternate computer hardware to enhance initial IDAFMS design parameters.

II. THE IDAFIPS SYSTEM

A. INTENT AND PURPOSE

Chapter I introduced IDAFIPS as a financial management system born out of necessity. The dual cash and fiduciary reporting system created during World War II and the numerous unrelated financial management systems developed for specific applications during the 1960's created a situation wherein the Navy had little control over its automated accounting, disbursing, and reporting systems. Local commanders relied almost exclusively on memorandum records to operate and manage their activities. Most Navy financial managers felt that official accounting reports were seldom produced in a timely manner, frequently contained outdated information, and proved to be of limited value. Both major claimants as expense limitation/sub-allocation holders and local activities (FAAs) as expense operating budget/allotment holders were frequently called upon by headquarters activities to provide current financial data from memorandum records to bring the most recently produced "official" accounting reports up to date. The Department of the Navy Financial Management Improvement Plan (FMIP) provided the basic support and guidance necessary to begin development efforts for a financial management system which could resolve many of the deficiencies in existing systems. The

FMIP specified several objectives to be met by all future development efforts for automated financial management systems. These objectives and the advantages accruing from each are discussed in the following paragraphs.

1. Standardized Financial Management Systems

Publication of the FMIP paved the way for development of financial management systems designed with the needs of all users in mind. One factor critical to any development effort was the standardization of both systems and application software to the greatest extent possible. Numerous CDAs had been performing design, development, and maintenance work on a wide variety of automated financial systems operated on several different Automated Data Processing (ADP) hardware suites. As the activities' needs changed or new requirements for report content or format were levied by higher authority, CDAs could not always accommodate the necessary alterations. Further, no single activity was responsible for coordination between CDAs maintaining financial systems for activities operating under NAVSO P-3006-2 prior to NAVCOMPT's designation as the IDA Project Office. Under its new charter, one of NAVCOMPT's primary responsibilities was the assurance of standardization among all systems developed under the IDA concept.

2. Integrated Data Bases

The FMIP additionally called for pursuit of integrated data bases to the greatest extent possible. IDAFIPS entire development has its conceptual roots in a single data base at each FIPC in which elements of data concerning each specific employment of funds are provided separately from accounting and disbursing sources. The data base is accessible by any activity using appropriate entry passwords. Each transaction is recorded in the data base only after it has passed all validation checks to insure that the data is in the proper format, matches the referenced document in all respects, and is provided by an authorized user. Transactions which fail the validation process are held in suspense pending correction by the sending activity. Separate reports of transactions held in suspense are produced periodically by the system.

3. Single Source of Entry

One significant initial benefit to the user in employing an integrated data base centers in a single source for data entry. After the initial record is established in the data base by the originating activity, all subsequent transactions can be entered quickly and efficiently without need for duplication of any data elements already residing in the master record. This saves a great deal of the time normally required to provide updated

information to an automated system employing batch processing. A second and equally significant benefit lies in the ability to eliminate duplicate records currently maintained at several levels of the reporting chain. These records frequently contain unmatched transactions, caused when one set of records contains more recent information than others. The difficulties in report reconciliation, particularly at the local activity which cannot operate effectively if available funds are tied up in duplicate or erroneous charges, are eliminated by the single source of entry for data.

4. Eliminate Memorandum Recordkeeping

By providing the most current data available through the IDAFIPS data base, the need to maintain memorandum records at the FAA is theoretically eliminated. Source documentation will continue to be maintained for audit purposes at the FAA, but the use of hard copy documentation to support memorandum records can be drastically reduced. There is a recognition that FAAs will likely continue to desire some form of hard copy documentation until a degree of confidence is developed in the system. Remote batch terminals (RBTs) provided to each FAA for use in transmitting periodic reports from the FIPC can be employed to receive any of numerous optional reports, including copies of "official" reports if required.

5. Provide Real-Time Record Update

Another of the primary benefits to be realized from development of a near real-time system such as IDAFIPS is the quantum improvement in the speed of transaction recording and report generation. Employment of modern telecommunication capabilities permits instantaneous data transmission from the FAA to the IDAFIPS data base maintained at the NAVCOMPT Data Processing Center (DPC) which serves each FIPC. Once the data passes validation, all applicable files, accounts, and records are updated by the system. Data current as of the most recent user input is provided in response to a status inquiry of a particular record by an authorized user. The most recently supplied data is always available to system users. The activity manager who wants to know the balance of a particular account or the payment status of a specific vendor invoice can obtain the desired information through a simple inquiry of the data base.

6. Utilize Telecommunications and ADP Technology

As noted earlier, employment of modern telecommunications capabilities is a cornerstone of the IDAFIPS concept. Considering the advancements that have been made in the telecommunications industry in the past ten years, the technology which will be employed in telecommunication facilities for IDAFIPS is far more complex than that

envisioned by its initial designers. The technical aspects of this complex network, however, are beyond the scope of this research and will not be discussed in great detail.

Closely aligned with the telecommunications network is the data processing system employed for IDAFIPS applications. One cornerstone of IDAFIPS is the use of dedicated hardware suites procured specifically to meet the processing requirements of each subsystem and completely dedicated to IDAFIPS applications. A factor which has plagued financial management systems over the years has been the degree of support provided by those who control the data processing assets at the activity. Accounting applications traditionally take a back seat to other, more operationally oriented applications. The employment of hardware funded totally by the IDA project and housed in NAVCOMPT controlled DPCs meets two prime demands placed on the data processing system. Current ADP technology specifically applicable to IDAFIPS processing requirements is employed, and real time processing is accomplished without interruption for other applications.

7. Timely Report Transmission

A final, but no less important, objective is to facilitate the production, certification, and transmission of required accounting and disbursing reports up the reporting chain in a more timely manner. In order to appreciate

the difficulty in achieving this objective, an understanding of the basic flow of appropriated funds and the financial reporting chain is needed. These separate flows are illustrated in Figure 3.

After apportionment of the Operation and Maintenance, Navy or Operation and Maintenance, Naval Reserve appropriation by the Office of Management and Budget (OMB), an allocation (a specified amount of the appropriation) is passed through the Secretary of Defense and SECNAV to CNO (OP-92). The allocation is subdivided into separate Expense Limitations (EL) and distributed to the various major claimants whose activities and forces are funded by the appropriation. The major claimants (EL holders) further subdivide the funds into Expense Operating Budgets (EOB) which are distributed in two ways:

(a) Shore activities whose accounting is governed by NAVSO P-3006-2 receive an EOB from the major claimant via the sub-claimant (Systems Commander or Type Commander).

(b) The EOB for activities whose accounting is performed under the provisions of NAVSO P-3013-2, Financial Management of Resources, Operating Procedures (Operating Forces) is provided to the Type Commander/sub-claimant who in turn issues an Operating Target (OPTAR) to each fleet unit.

The flow of financial data up the reporting chain originates at the FIPC where the integrated data base which supports IDAFIPS is maintained. Shore activities submit transaction data to the FIPC via the

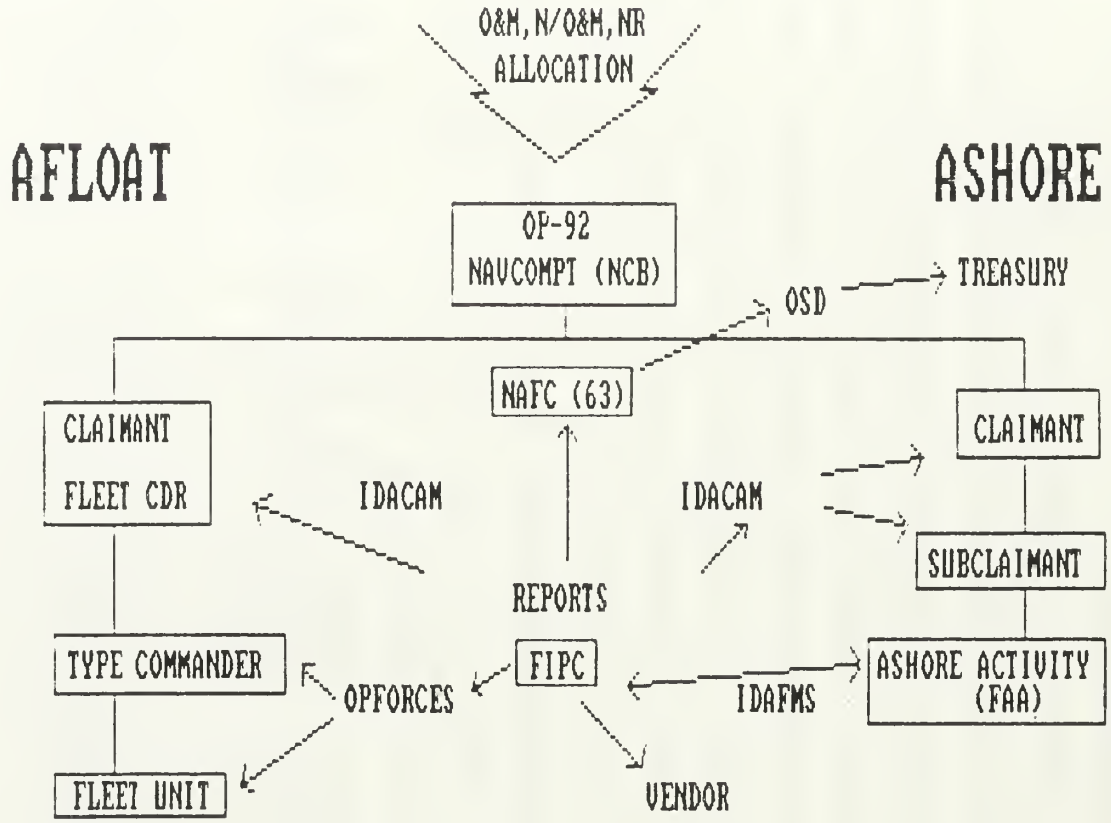

Figure 3
Flow of Funds and Reports

telecommunication network and employ the IDAFMS subsystem to process the data. Fleet units submit data to the FIPC either via the telecommunication network or in batch mode, depending on location and communication facilities. A separate subsystem, IDAFMS for the Operating Forces (IDAFMS OPFORCES), processes this information into the integrated data base and provides reports to the Type Commander. Reports to the major claimant (and to the sub-claimant for shore activities) are produced and forwarded by the Claimant Accounting Module (CAM), the third IDAFIPS subsystem. Consolidated reports of all financial transactions which affect a specific appropriation are extracted from the data base by the Financial Reporting System (FRS). These reports and detailed data concerning invoice payments and collections made at various FIPCs are transmitted to the Navy Accounting and Finance Center for consolidation at the appropriation level.

Current financial systems require a cutoff date from three to five days prior to the end of the reporting period in order to process all transactions entered into the system by the period's ending date. Processing of financial reports then frequently requires two or three workdays, and reports must then be verified before being mailed in hard copy form to the major claimant. By the time the claimant receives the data, little time remains

for analysis prior to its consolidation and transmission up the reporting chain. The process is repeated until it is received by the headquarters level and by NAVCOMPT (NCB)/OP-92. This current processing methodology is difficult to manage and results in financial data which is not current and has had little analysis or verification prior to being forwarded up the reporting chain.

While many FAAs currently experience continuing difficulty in meeting report submission deadlines, employment of real time processing using an integrated data base and telecommunications capabilities permits vast improvements over current methodologies. FAAs can process transactions into the system through the end of the reporting period. Reports are produced by the IDAFMS subsystem based on FAA request and are transmitted back to its remote batch terminal where hard copy is generated for review and verification. After the reports are approved and certified by the FAA, an electronic certification is encoded with the report data in residence within the data base. The reports are then transmitted via the telecommunication network to the designated major claimant. The entire process from final transaction input through report transmission to the claimant can be accomplished within hours.

B. THE IDAFIPS SUBSYSTEMS

Figure 3 showed the various subsystems which together comprise the entire IDAFIPS system. Each of these subsystems is a unique module unto itself, yet each interacts with the other subsystems in order to create a truly integrated system. The following paragraphs will briefly discuss the four subsystems of IDAFIPS in general terms. Since each subsystem is in a different state of development at the time this thesis is written, the reader is referred to the structured analysis documentation for specifications of the required inputs from other IDAFIPS subsystems, the specific processes performed, and the outputs generated by each subsystem.

1. Integrated Disbursing and Accounting Financial Management System (IDAFMS)

As noted earlier, IDAFMS is the primary subsystem within IDAFIPS and the first subsystem to be developed. It is intended to be the standard field level financial management system for activities funded by the Operation and Maintenance, Navy (O&M,N); Operation and Maintenance, Naval Reserve (O&M,NR); and Research, Development, Test & Evaluation (RDT&E) appropriations as well as certain allotments (grants of funds) from other appropriations. Its operational use is described by the Navy Training Plan as follows:

> The IDAFMS is a financial management system with the objective of providing a standard Navy-wide field level disbursing and accounting financial management system that will serve the needs of all users and provide current financial data through on-line update at the time of data entry, regardless of site entry. The IDAFMS users will be financial managers below Navy Department levels operating under Resource Management System (O&M,N and RDT&E,N) and allotment accounting (excluding Navy stock fund) requirements. [4:I-2]

IDAFMS is based on the concept of employing regional random-access data bases. There are currently thirteen IDA regions established within which fifteen FIPCs provide service. Figure 4 specifies the regions and the FIPCs supported by the NAVCOMPT Data Processing Centers within each region. Additional FIPCs are established in regions four and ten at the Fleet Accounting and Disbursing Centers, Atlantic and Pacific (FAADCLANT and FAADCPAC) for dedicated support of fleet units. This concept is discussed under IDAFMS for the Operating Forces. The data base at each FIPC is accessible through remote terminals for on-line update as well as report transfer. It contains sufficient information to meet all financial management needs of the FAAs supported by that FIPC, all support requirements for operation of the FIPC itself, and all reporting requirements levied by higher authorities.

More than nine hundred FAAs will be supported by the total IDAFMS network. These FAAs report financial data to many activities at different levels in the reporting

IDAFIPS Regions and Supporting FIPCs

Region	FIPC
2	NPFC Philadelphia, Pa.
3	NRFC Washington, D.C.
4	NSC Norfolk, Va.
4F	FAADCLANT Norfolk, Va.
5	NSC Charleston, S.C.
6	RAADC Jacksonville, Fl.
7	NETFIPC Pensacola, Fl.
8	NAVRESUPPOFC New Orleans, La.
9	NRFC Great Lakes, Il.
1Ø	NSC San Diego, Ca.
1ØF	FAADCPAC San Diego, Ca.
11	NCBC Port Hueneme, Ca.
12	NSC Oakland, Ca.
13	NSC Puget Sound, Wa.
14	NSC Pearl Harbor, Hi.

Figure 4
IDAFMS Regions and Supporting FIPCs

chain, each of which has specific financial information requirements. IDAFMS will employ the telecommunications capabilities discussed earlier to provide Navy management structure with data for:

1. Planning, programming, and budgeting resources
2. Executing against budgeted resources
3. Effective control over all assigned funds for which the Navy is responsible
4. Timely, complete, reliable, and accurate financial reports for internal Navy management use and for external agencies and authorities having financial control responsibilities (e.g., OMB, Congress, Treasury, DOD) [4:I-3]

Previous reference was made to the dual reporting system for accounting and disbursement (invoice payment) data. For a given resource allocation, IDAFMS employs the accounting record established by the FAA as the basis for all further processing; disbursements are produced as a by-product of the system after invoice data is supplied by the bill payment section of the FIPC. Separate reports for the FAA and the Disbursing Officer are produced from the integrated data base. Under IDAFMS, the FAA is responsible for most of the functions previously performed by the Authorization Accounting Activity (AAA). These functions include establishment and update of all accounting records and the maintenance of data base integrity. The FAA thus assumes responsibility for maintaining its own accounting records and all source documentation.

2. Integrated Disbursing and Accounting Financial Management System for the Operating Forces (IDAFMS OPFORCES)

Unlike most shore based activities funded by the O&M,N and O&M,NR appropriations, operating fleet units have many idiosyncrasies unique to their mobile mission. In recognition of this mobile mission, accounting and reporting procedures for the operating forces are significantly different from those of shore activities. NAVSO P-3013-2 specifies the accounting, reporting, and financial management procedures for these units; its requirements and

formats differ greatly from those specified in NAVSO P-3006-2 used by ashore commands.

IDAFMS OPFORCES is designed to include all fleet units funded by the O&M,N and O&M,NR appropriations in the IDAFIPS reporting network. It is intended to improve the timeliness, accuracy, and usefulness of financial data generated by fleet units and reported through FAADC-LANT, FAADCPAC, and the Construction Battalion Center, Port Hueneme, to the major claimants. It is "a stand alone processing system operating in both batch and interactive transaction-driven modes." [5:I-2]

Primary users of the subsystem include the Fleet Commanders and their subordinate activities (including Type, Group, and Squadron Commanders), Naval Construction Forces, and individual operating units. It will perform all accounting functions for each unit and will provide all requisite financial data and cost reports to financial managers at the operating unit (OPTAR holder) and the Type Command (EOB holder) as well as to higher authority. IDAFMS OPFORCES will employ teleprocessing capabilities which permit transmission of data for resource budgeting and programming, effective control over funds, and accurate and timely information for internal management and external reporting. [5:I-3]

Conceptually similar to its counterpart for ashore activities, IDAFMS OPFORCES is designed to provide a complete financial management and reporting system to its users. The following features are included in the subsystem:

1. An integrated accounting and reporting system for deploying and shore based OPTAR holders
2. One-time source data capture
3. Mechanized interface with other IDAFIPS subsystems to eliminate hard copy generation
4. A standardized, highly responsive financial management system
5. A single data base with daily updates and report generation and on-line inquiry capabilities
6. Interactive edit and validation at source of input [5:I-3]

Specific requirements for data transmission from operating units to the servicing FIPC are not finalized at this time. Some potential alternatives include transmission using the existing Navy communication system, employing dedicated frequencies and/or channels, submission of batch data on magnetic tape or disc, and employment of modems when communication lines are available. Each of these alternatives and the considerations unique to a mobile unit are explored in the functional description for IDAFMS OPFORCES. The reader is referred to this documentation for a more detailed description of IDAFMS OPFORCES telecommunications requirements.

3. Financial Reporting System (FRS)

One of IDAFIPS' cornerstones is the capability to transmit financial data between FIPCs and from each FIPC to the headquarters activities it services. FRS is designed to carry out specific functions related to transfer of data originated in either the IDAFMS or IDAFMS OPFORCES subsystems. Data transferred between FIPCs relates to payments made by one disbursing facility on behalf of an activity serviced by a separate FIPC. Information concerning such payments is transmitted between regional data bases, and accounting records for each EOB or OPTAR holder are updated accordingly. FRS retrieves all data concerning payments made by the disbursing offices serving the FIPC and produces required reports for the disbursing officer. Its final primary function is to consolidate fiduciary and cash management data for activities serviced by the FIPC and report the summary data to headquarters activities. [6:I-4]

FRS is comprised of both systems and application software employed on the IDAFIPS hardware at each regional DPC. The subsystem is both on-line and interactive; it employs and interacts with the IDAFIPS data base at each FIPC. FRS provides the following:

1. Reporting at the Department of the Navy level as specified by NAVCOMPT

2. Detail expenditure and collection data for processing by the Centralized Expenditure/Reimbursement Processing System (CERPS)

3. Reports of funds expenditures and collections at the detail transaction level to AAAs

4. Automated cashbook processing for Disbursing Officers

5. Overseas and afloat processing [6:I-2]

FRS is designed to provide significant improvements in the accuracy of reports, more timely response to informational requests from higher authority, and a reduction in the amount of manual intervention currently required to transfer this large amount of data between activities. These objectives are accomplished by the use of "an on-line, fully integrated data base supported by a Data Base Management System (DBMS) that provides for interactive data entry, file maintenance, editing, validation, balancing, and query." [6:I-3]

FRS will thus act as the linking mechanism between many of the participants in IDAFIPS. Its capabilities will permit interactive processing for many functions currently performed in batch mode and requiring considerable manual interaction. The vast quantity of magnetic tape and hard copy documentation needed to support reporting requirements for the activities serviced by FRS can be reduced to a fraction of its former requirement. On-line edit, suspense, and error correction capabilities will

permit noteworthy improvements in the validity of data reported through the system.

4. Claimant Accounting Module (CAM)

Within the Navy financial reporting chain, major claimants are those commands which act as Expense Limitation (EL) holders for expense (O&M,N and RDT&E) appropriations. As shown in Figure 3, these activities provide Expense Operating Budgets (EOB) to their subordinate commands and submit consolidated reports of financial activity within the claimancy to the Chief of Naval Operations (OP-92) as the Responsible Office for the O&M,N appropriation or to the Office of Naval Research as the Responsible Office for the RDT&E appropriation. As detailed above, the regional data base maintained at the NAVCOMPT DPC acts as the collection point for all financial data from both shore activities and operating forces. The CAM functions to consolidate and summarize data in the IDAFIPS data base, transmit the data to the major claimant, and produce official accounting reports for submission to higher authority. [7:I-2]

CAM will produce reports in accordance with NAVSO P-3014-1, Financial Management of Resources, Operation and Maintenance (Departmental Level), the directive specifying reporting and accounting requirements for claimant accounting. Using interactive terminals linked to the

IDAFIPS data base, claimant financial managers can perform on-line inquiry, update of files, and report generation. Each claimant is supported by one of the regional DPCs. Due to their physical locations, however, some DPCs support multiple claimants. The CAM application software operates in conjunction with IDAFMS to perform data base management on the integrated data base. It is responsive to the direction of the serviced major claimant for accomplishment of the processing necessary for support of that claimant's mission. Each claimant is responsible for providing appropriate direction to the CAM in order to receive desired output.

Under current plans, the CAM will service thirteen major claimants using a configuration of five regional DPCs. A direct interface with IDAFMS will be established to support the CAM input requirements. Data will be transferred between various claimants and between DPCs operating the CAM for one or more claimants via the IDA interregional telecommunications network. [7:I-3]

C. IDAFIPS PROJECT MANAGEMENT

As previously noted, IDAFIPS was born out of the Financial Management Improvement Plan instituted in 1972 by SECNAV. It was formally established as a project in 1975 when NAVCOMPT established the IDA Project Branch and developed a plan to investigate applications where concepts

of integrated data bases could be applied to a broad range of accounting systems. NAVCOMPT-authorized developmental efforts, using IDA principles, resulted in prototype systems in several major claimancies. The IDA concept was formalized as a standardized system by the Assistant Secretary of the Navy (Financial Management) in February 1980. He directed that a single financial management system be developed by a dedicated CDA and that the system be operated on standard dedicated hardware. [2:9] IDAFIPS (known then only as IDA) thus received the support it required to swing into full scale development efforts.

1. Navy Accounting and Finance Center (NAFC)

The Secretary of the Navy assigned project management responsibility for design, development, and implementation of IDA concepts to the Comptroller of the Navy in 1975. Within the NAVCOMPT organization, a segregation of functions exists between two directorates as depicted in Figure 5.

The Director, Office of Budget and Reports (NCB) is responsible for maintenance of the official accounting records and provision of all required accounting reports at the Navy Department level. The Assistant Comptroller, Financial Management Systems (and Commander, Navy Accounting and Finance Center) (NCF) is responsible for design, development, and operation of accounting, disbursing, payroll,

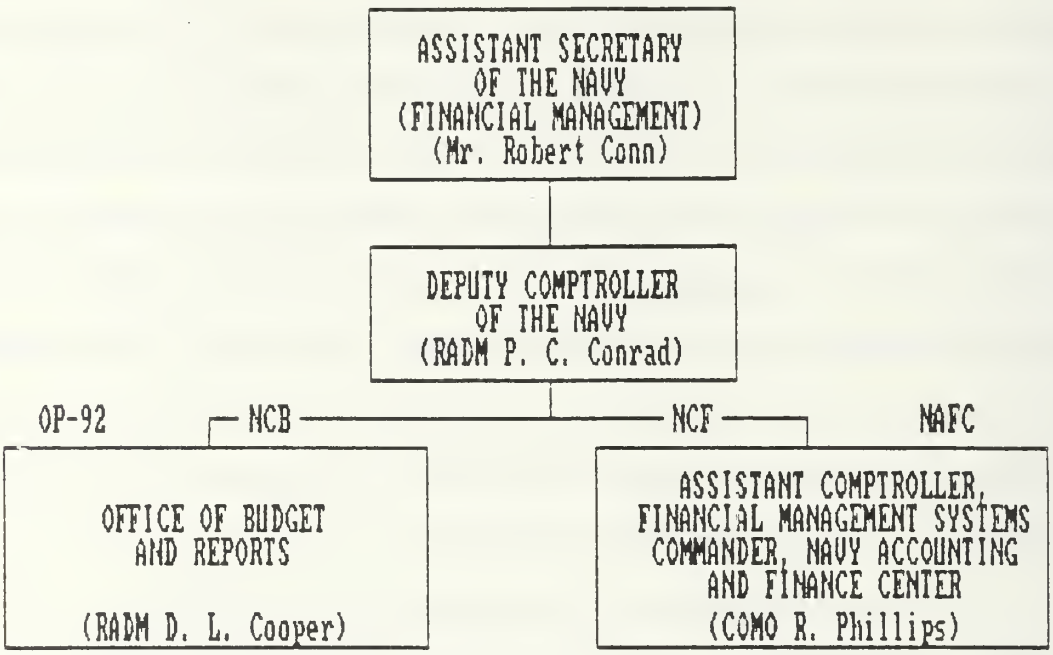

Figure 5
NAVCOMPT Organization

and financial management systems in use throughout the Navy. NAFC is thus responsible for the development and maintenance of all financial and accounting systems in use throughout the Navy.

Within the NAFC organization, responsibility for IDAFIPS rests with the NAVCOMPT IDA Project Officer (NAFC-62). The Project Officer and his supporting staff have overall responsibility for:

-system design

-application software development and testing

-supporting hardware and system software procurement, installation, and testing

-NAVCOMPT Data Processing Center site selection, preparation, and operation

-systems testing

-development of all supporting documentation

-implementation of each IDAFIPS subsystem including development and execution of Installation and Implementation Plans (I/IP) for each FIPC

-all training of personnel associated with each subsystem

-funding responsibilities for each of the above.

Obviously, a project as complex as IDAFIPS requires a sizable supporting staff. The Project Office is largely organized along functional lines with overall coordination responsibilities for each subsystem assigned to key staff members. Many of these personnel have a wealth of experience in governmental accounting systems and most have been associated with the project for a number of years.

Despite the professional competence present throughout the Project Office staff, IDAFIPS cannot be developed and implemented without the efforts of additional functional experts. Much of the required expertise exists at the Central Design Agency and will be discussed below. Additional requirements for expertise in specific areas are met by contractual support. Commercial contractors

are utilized largely to conduct studies and prepare plans related to training methods, training requirements, and implementation procedures. These studies and plans vary in quality, dependent largely on the contractor's background and expertise in Navy automated financial system development. A contract has been awarded for the development of all training curricula and materials to be employed throughout the IDAFIPS implementation process; specifics of this contract will be discussed in Chapter V.

2. Navy Comptroller Standard Systems Activity (NAVCOMPTSSA)

After formal establishment of the IDA Project Office in 1975, development of interim/prototype integrated accounting systems for the major claimants noted previously was accomplished largely by those claimants' primary supporting CDAs. Figure 6 shows the interim IDA systems and the supporting CDA for each system.

Interim IDA Systems

System	CDA
IDA II B(E)	Fleet Material Support Office
NETFMS	Navy Comptroller Standard Systems Activity
IDA/RMS	Navy Regional Finance Center Great Lakes
IDA II A	Fleet Material Support Office

AMALGAMAN IDA/RMS	Construction Batallion Center Port Hueneme
STARS	Fleet Material Support Office

Figure 6
Interim IDA Systems

One of the requirements for a standard financial management system set forth by the Assistant Secretary of the Navy (Financial Management) in February, 1980 was the employment of a single CDA with direct reporting responsibilities to NAVCOMPT. [2:9] Each of the interim systems and its supporting CDA was evaluated by NAVCOMPT (NAFC-62). The purpose of the evaluation was to determine which system encompassed the majority of design parameters set forth in the IDA General Design Manual, NAVSO P-3583 and the IDA Detail Design Manual, NAVSO P-3573. The Naval Education and Training Financial Management System (NETFMS) was chosen as the basis for the new system, and the Management Information and Instructional Systems Activity (MIISA), a CNET field activity at Pensacola, Florida, was designated the CDA for the IDA project.

As the entire IDA project grew to encompass four subsystems, NAVCOMPT established a new activity, the Navy Comptroller Standard Systems Activity (NAVCOMPTSSA) at Pensacola in May 1982 to act as CDA for all future Navy-wide standard financial systems. NAVCOMPTSSA's initial

responsibilities centered on IDAFMS and the Navy Standard Civilian Payroll System. Initial staffing was obtained from the IDAFMS Department of MIISA; additional personnel were added to support the other IDAFIPS subsystems described above. [8:1]

NAVCOMPTSSA's mission as the single supporting CDA for NAVCOMPT projects is:

> To design, develop, implement, operate, and maintain standard Navy financial systems in accordance with Department of the Navy Automated Data Processing (ADP) standards; provide for equipment and services acquisition and perform contract management in support of standard Navy systems; conduct functional and economic analysis to support systems project documentation and approvals; and accomplish other tasks as assigned by the Comptroller of the Navy. [9:2]

NAVCOMPTSSA is organized along functional lines based on the type of system being developed. Responsibility for IDAFIPS design and development rests largely in the Appropriation Systems Department (Code 20). Three divisions are established as depicted in Figure 7, each of which is dedicated to particular functions in the development effort.

The Systems Management Division performs coordination activities both within the department and with user activities. It ensures that internal accounting and audit controls are developed and maintained, assesses the impact of NAVCOMPT directives on each system, coordinates both initial and

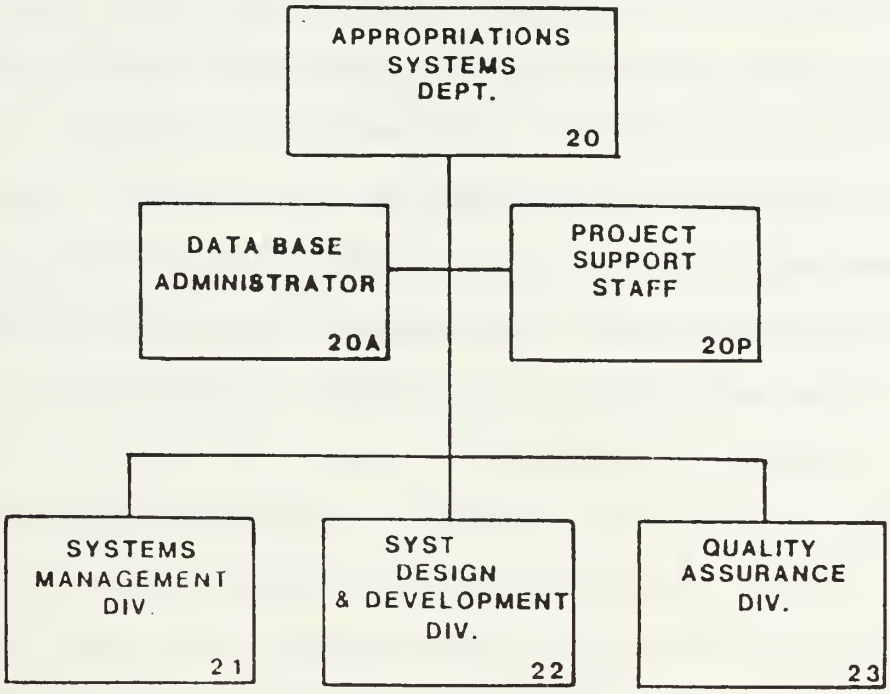

Figure 7
NAVCOMPTSSA Appropriation Systems Department

follow-on training programs to be conducted at FIPCs throughout the IDAFMS network, and provides consultation support to all system users.

The Systems Design & Development Division is the heart of the development effort. Its numerous responsibilities are centered in the transformation of requirements into ADP concepts; the development of detailed system specifications; the coding, testing and debugging of application programs; the development of test and implementation plans; and the management of contractor programming support.

The Quality Assurance Division takes independent action to test the logic, design characteristics, and application programs against the specifications and requirements set forth by NAVCOMPT. ADP support for each of the divisions is provided by a detachment in Memphis, Tennessee which operates and maintains the IDAFIPS hardware suite test site. Data is transmitted via telecommunication link in the same manner as employed in the IDAFIPS network.

Although NAVCOMPTSSA is a sizable organization with a wealth of talent, commercial contractors are utilized on a regular basis to provide expertise not available within NAVCOMPT. Contractor support is being employed largely in the development of Installation and Implementation Plans for each FIPC and in the development of training programs which will support each implementation plan. Contractor services were employed earlier in the project to investigate the problems unique to training FIPC and FAA accounting and disbursing personnel. Under existing contractual stipulations, contract personnel work on-site with NAVCOMPTSSA personnel in Pensacola. The development of training programs to support implementation of each IDAFIPS subsystem is truly a collaborative effort.

3. User Involvement in the Development Process

Active involvement by the users of IDA systems has been a key consideration since the project's inception.

Each of the interim systems developed after 1975 received direct input from its sponsoring major claimant and the activities which would employ the system. Each of the claimants viewed the opportunity to develop its own IDA system as a chance to eradicate the deficiencies of previous systems while incorporating IDA principles. These systems, which remain in operation today, are viewed as highly satisfactory to many of the activities which they support. There will undoubtedly be strong reluctance to give up what some consider to be functioning systems.

a. Field Managers' Role in Design

The IDA Project Office initiated actions early in the IDAFMS development process to include field activities and major claimants as players in each major step of the project. After submission of the IDAFMS Functional Description (FD) rough draft by the contractor, copies were provided to selected activities for comment. Upon incorporation of the responses received, a user's conference was held in June, 1982, to discuss the draft FD. Additional changes resulting from the conference were incorporated in the draft prior to its release for official comment. [10:1]

b. User's Advisory Group

Formation of a User's Advisory Group (UAG) soon after publication of the IDAFMS FD in December, 1982,

signaled a new level of involvement by system users in the IDAFMS development process. Chaired by NAVCOMPTSSA, three to ten day conferences are centered on airing concerns from claimants, FIPCs, and FAAs regarding the design specifications for the system. Each UAG centers on review of the structural analysis format for each of the processes performed by the IDAFMS application software. (Structured analysis will be discussed in some detail in Chapter III.) The UAG members, largely experienced accounting technicians and budget analysts, are placed in working groups to review and discuss systems output which are not prescribed by higher authority. [11:2]

A concerted effort is made to accommodate the preferences and desires put forth by UAG members, since these individuals are the ones who will have to utilize the system in the field. UAG meetings continued on a regular basis throughout the design and development phases. A sixth and final meeting was held in December, 1984, in order to conduct a final review of the structured analysis documentation and to provide progress reports on conversion, implementation plans, system demonstration tests, and training. [12:2]

c. Field Surveys

Further user involvement in IDAFIPS development has occurred in the accumulation of data necessary to

build effective training programs for each of the subsystems. Separate phases of training plan development have been contracted to different companies, each with its particular strengths. One firm has conducted a review of existing system documentation in order to ascertain the knowledge and skills needed by personnel interacting with the system. In a separate survey, a work assessment questionnaire was administered to personnel at seven different FIPCs in order to determine the general level of experience and the specific tasks currently performed by technicians who will interact with the system.

d. The FIPC/FAA Study

Possibly the most important piece of research in support of training program development is the FIPC/FAA Study conducted by Westec Services, Inc. under contract to NAVCOMPT. This study is separate from those noted above and has not been completed at the time of this writing. The intent of the study is to develop a two models regarding interface between the FIPC and the FAA. The first model will describe the manual procedures and interfaces which exist in current FIPC/FAA relationships throughout the IDA network. The second model will describe the mechanized interface between FIPC and FAA. [12:1] By studying the data obtained from this research, training developers can gain a comprehensive understanding of relationships

as they actually exist. These relationships can then be compared with the documentation which describes how the FIPC and FAA will need to interface under IDAFMS, and more appropriate training methods and materials can be employed. In short, if exact starting conditions are known, a more effective program can be developed.

D. SUMMARY

The development of IDAFIPS as a comprehensive financial management system is a lengthy and extremely complex task. Beginning with the Department of the Navy Financial Management Improvement Plan, the project has evolved to include four subsystems, each interacting closely with the others. The management considerations necessary to develop a real-time system driven by transactions entered from a large network of users are immense. Several supporting organizations including the IDA Project Office, NAVCOMPTSSA, private contractors, and the system's users are engaged in an effort which has required ten years to bring to a fully operational capability. In Chapter III, the capabilities, requirements, and operating characteristics of IDAFIPS' major subsystem will be reviewed and analyzed. The chapter is intended to provide an appreciation of the functions and processes which IDAFMS will perform at the FIPC and the FAA as well as the enhanced aspects of control which the system brings to its users.

III. THE IDAFMS SUBSYSTEM

A. IDAFMS AS THE FOUNDATION OF IDAFIPS

Chapter II introduced IDAFIPS as a financial management system which encompasses transaction processing from a large variety of reporting activities. It is the Navy's single largest financial management system, and serves more expense operating budget (EOB) and operating target (OPTAR) holders than any other standard appropriation accounting system. In conducting accounting and disbursing functions for most Navy shore activities and fleet units (with the exception of military payroll and claim settlement which remains with afloat disbursing officers), IDAFIPS provides timely, accurate data to managers throughout the financial reporting chain.

When the IDA Project Branch was established in the NAVCOMPT organization in FY74, its work plan centered on shore activities funded by the O&M,N appropriation and operating under NAVSO P-3006-1. The inclusion of operating forces within the system was viewed as a long range objective of the system. All resources were applied toward the development of processes to satisfy the pressing need for improvement in accounting and disbursing systems ashore. As developmental efforts continued in the project, the complexities of a system which could accomplish the

objectives noted in Chapter II began to increase dramatically. A more detailed breakdown of functions was required if the project was to be managed efficiently. The project was officially designated as IDAFIPS in 1980 with the subdivision of functions into the four subsystems discussed in Chapter II.

IDAFMS is the first of the subsystems to be designed and implemented. In order to permit execution of all IDAFMS functions, the supporting software to perform accounting and disbursing tasks and data transmission via the telecommunications network must be included. This represents an extremely large, complex set of interrelated processes. The IDAFMS-OPFORCES, FRS, and CAM subsystems utilize the data transmission and interface capabilities included with the IDAFMS software. While each is very complex as a single subsystem, none compare with the complexity of IDAFMS.

All accounting processes are initiated by the recording of financial data at its source. IDAFMS acts as the foundation for IDAFIPS by capturing fund authorization, commitment, obligation, and expense data at its point of entry in the FAA. Data representing transactions at the FAA enters the integrated data base and either establishes new records or updates existing ones. The data subsequently becomes the source for reports in both the cash and fiduciary

reporting systems. IDAFMS is thus the medium through which financial reporting requirements in both systems are met.

With the exception of source documentation maintained for audit trail purposes, the myriad of files created by IDAFMS become the repository of all financial data for each FAA. Detail transaction files are established and maintained on-line by the system. These files are updated as additional transactions enter the system from a variety of sources. Data necessary for report generation and transmission to the major claimant, NAVCOMPT (OP-92), and the Treasury is available and accessible whenever needed. Capabilities included in the system permit generation of numerous reports on a scheduled or demand basis.

The data base created and maintained by IDAFMS is utilized an an integral part of each of the remaining IDAFIPS subsystems. IDAFMS OPFORCES establishes records of obligations and expenses incurred by each operating unit in the data base, and dealer's invoices for material or services provided to these units are paid by the same means as those for shore activities. FRS interacts with each regional data base; it contains the software which permits transmission of payment information between data bases serving different FIPCs. CAM extracts and summarizes data which is coded for the major claimants supported by that FIPC. All reports provided through each of these

subsystems rely exclusively on the integrated data base as the source of information.

B. SYSTEM DESIGN METHODOLOGY

As noted above, one of the primary challenges facing systems designers at NAVCOMPTSSA was the complexity of the functions to be performed by IDAFMS. Each major function employs input data from various sources and supplies output to follow-on functions in IDAFMS and other IDAFIPS subsystems. Previous automated financial management systems often suffered from incomplete and/or insufficient design documentation; maintenance of the application software thus became a difficult task for CDA personnel who were not involved in the initial design effort. A method of systems design and documentation was needed which could separate the multitude of IDAFMS functions into manageable pieces and could provide complete, usable documentation for design personnel and users alike. One solution to these requirements is found in the Yourdon methodology of systems design.

The Yourdon methodology can be described as a means by which a highly structured, symbolic model of the function(s) to be performed by a system can be developed. Employment of the method begins with definition of the primary function(s); each function is then subdivided into its supporting sub-functions. Sub-functions are further divided

through additional levels until the functional primitive is achieved. The functional primitive is defined as: "the lowest level that a process can be partitioned and still be meaningfully described." [9:32] This top down methodology results in a large number of support modules, each of which interacts with others to form building blocks for the primary function. The building blocks at any particular level combine to support a single block at the next higher level. In this manner, the partitions created between levels can be managed separately, and the effect of any change in one level can be traced throughout the documentation. Figure 8 depicts the subdivision of a function into supporting modules at separate levels.

The Yourdon methodology results in what is termed a structured analysis of the functions under development. By developing data flow diagrams using standard symbology, a graphic representation is created which depicts the processes or mini-systems employed and the flow of data between these processes. Each diagram in turn facilitates creation of a "mini-specification", the written logic describing the flow and transformation of data within the process. A data dictionary is established to provide for standard definition of terminology declared in the data flow diagrams. The data flow diagram, mini-specification, and data dictionary combine to facilitate creation

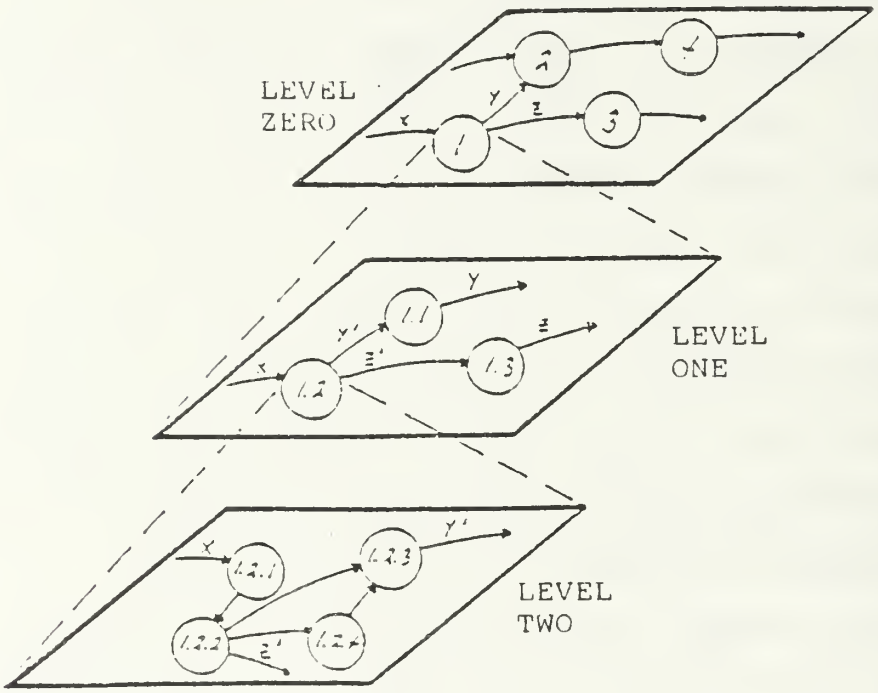

Figure 8
Subdivision of a Function to Supporting Levels

of structured analysis narratives for each mini-system. Each narrative describes the functions performed in a mini-system, the inputs received from other processes, and the outputs to higher levels in the design structure. These narratives are of particular value in understanding the

structured analysis documentation and in communicating system functions and capabilities to user personnel.

As an initial step in employing the Yourdon methodology, NAVCOMPTSSA personnel analyzed the IDAFMS Functional Description (FD), which is the detailed narrative of each process performed in IDAFMS along with its input and output requirements. From the FD, the major processes to be performed within IDAFMS were identified and defined in specific terms. Each of these major processes was designated as a "Level Zero" process, indicating its position at the top of the structured analysis partitions. A "Level Zero" process functions in coordination with other such processes to form the entire system under development. Nine of these "Level Zero" processes comprise IDAFMS.

After identification of each "Level Zero" process, the analysis of that specific process continues, level by level, until the functional primitive is reached. In IDAFMS numerous levels have been created prior to reaching the functional primitive. A description of the functions performed below level zero, however, is beyond the scope of this thesis.

Three related products are created by completion of the structured analysis effort. The first is a written model of the new system which describes in specific terms the functions which the new system must carry out, assuming

perfect technology. The second product is another written model of the system which describes the functions to be carried out, assuming imperfect technology. The final product of the effort is a complete set of data structure diagrams, a paper depiction of the data elements within IDAFMS and their logical relationship to one another. [13:18]

C. IDAFMS PROCESSES

Through the structured analysis process described above, nine "Level Zero" processes were identified in IDAFMS. It is emphasized that these are not stand-alone processes. Each one receives input from outside sources and from one or more "Level Zero" processes. Similarly, each provides output to other processes and to information recipients outside the IDAFMS subsystem. The flow of data from one process to another occurs through the integrated data base on a real-time basis. Figure 9 depicts the nine processes, each providing data to the integrated data base and receiving information from other processes passed via the data base. Files, records, and general ledger accounts are updated as each new data element enters the system, thus obviating the need for batch processing.

1. Zero Level IDAFMS Processes

The following paragraphs will describe the functions of each process in general terms. Each process, also called

a "bubble" in structured analysis terms, is numbered to facilitate tracking of functions that occur in successive levels. The numbering methodology has no relation to the process itself; processes are not, therefore, discussed in numerical order.

Bubble One: Maintaining Financial Control Data. This process is used to maintain cost classification dictionaries, activity organizational data, and job cost data, all of which is unique to the FAA. [14:6-2] Since cost accounting at Navy activities is conducted by means of a job order system, this process permits the establishment of the cost data upon which all job orders are based, permits establishment of new job orders, and makes adjustments to old job orders when needed. The process maintains the master job order files against which all input documents are validated.

Bubble Eight: Establish Funds and Allocation Data. This category of processing significantly impacts the financial control function performed by the Comptroller at the FAA. It is used to establish and maintain a master file of fund authorizations (both direct and reimbursable) and their limitations, and to provide for fund and budget allocation tracking. The process is beneficial to both budget formulation and execution in that it provides for maintenance of direct funding authorizations to the activity

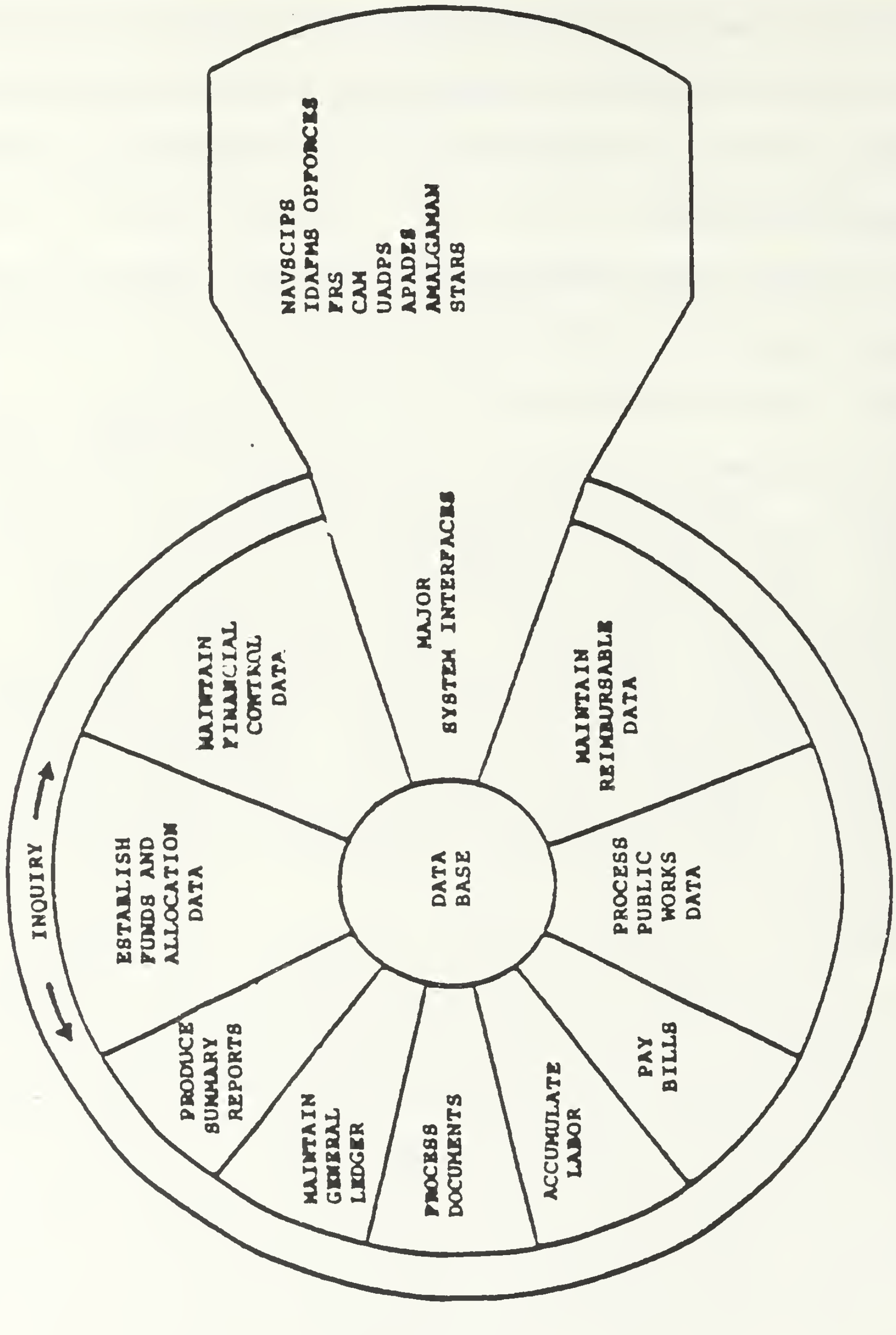

Figure 9
Zero Level IDAFMS Processes

as well as for distribution and allocation of those authorizations within the activity. Budget plans can be input into the process for use in tracking original budget formulation data, either planned or authorized, in comparison to actual obligations and expenses. Direct funding authority can be allocated based on any one of several cost categories dependent on the needs of the activity. Non-financial work unit data for specific cost accounts is collected and compared with budget data. Reimbursable Work Order authorization amounts can be added and/or updated in order to reflect the latest fund availability status for the FAA. [14:6-25] The combination of these capabilities falls short of producing a complete budgeting package. It does, however, significantly enhance the budget formulation and execution process by permitting the Comptroller to specify summarization codes which will yield reports that present data in the manner best suited to the activity's budget methodology.

Bubble Two: Process Documents. This process is the heart of IDAFMS and is used to provide document status and job cost data used in practically all IDAFMS processes. It provides for validation of all input documents prior to entry into the system; an on-line suspense file of transactions failing validation is maintained in order to permit correction. [14:6-5] This function is the most

complex of the IDAFMS processing categories and is performed by several supporting "sub-processes". Collectively these processes facilitate the recording of all accounting transactions, including individual document inquiry into any of the files. Suspense reports are produced for both accounting and disbursing transactions which have not cleared the system. Invoices for goods/services supplied by commercial activities are tracked from receipt until final bill payment. Document-level reports of several types are produced in order to appraise local management of the status of specific transactions such as overaged outstanding travel advance reports and contract completion status reports which require close attention.

Bubble Five: Pay Dealer's Bills. This process encompasses all functions associated with the payment of dealer's bills by the designated disbursing facility serving the FIPC. Mechanized payment validation occurs based on invoice and receipt certifications entering the system in Bubble Two discussed above. Checks are generated, and various disbursing reports required for maintenance of the Disbursing Officer's accountability are produced. Contractor information status is maintained in order to assure payment to the proper contractor and to prevent payment to contractors indebted to the government. Interfaces are maintained with the Financial Reporting System,

the Fleet Accounting and Disbursing Centers (for IDAFMS OPFORCES), the Navy Stock Fund, and Financial Processing Centers supported by each FIPC. [14:6-16]

Bubble Four: Accumulate Labor. The cost of civilian labor represents 65-75% of most FAAs' operating budget. Accumulation of labor costs and hours is an essential function of every cost accounting system. This process computes, accelerates, and accumulates civilian labor costs and hours on an "exception" basis. Labor exceptions are applied to appropriate general ledger accounts and job cost files. A reconciliation of reported labor exceptions is conducted with bi-weekly payroll data in order to assure that all labor is properly costed. Military labor strength is provided by the FAA monthly, and the value of military labor can be distributed to designated job orders. An interface is maintained with FRS for transmission of labor data between FIPCs, and all required reports reflecting labor costs are generated throughout the process. [14:6-13]

Bubble Three: Maintaining General Ledger. This process establishes the uniform General Ledger accounts and ledgers for each operating budget or allotment held at the activity. It processes all incoming document transactions for both current and prior years and posts these transactions to the appropriate accounts. As an external output it produces the NAVCOMPT 2199 Trial Balance Report

for all appropriations utilized by the FAA. The system additionally produces a transaction journal used as an audit trail for tracking transaction postings within IDAFMS. [14:6-11] Contrasted with Bubble Eight described earlier, this process maintains the activity's fund authorization, obligation, and expense records on a macro basis. Bubble Eight permits the local manager to establish separate internal allocations and monitor their status. The primary interest of activity financial managers lies in the Trial Balance from which the status of funds is obtained; this is the activity's overall view of annual obligations in each appropriation.

Bubble Seven: Process Public Works Data. The management of a public works function at a local activity requires specific support rendered through the cost accumulation and accounting functions performed in IDAFMS. This process retrieves, tabulates, and summarizes both labor and material issue data applicable to job orders assigned to public works functions. The entire range of tabulated reports specified by Naval Facilities Engineering Command directives are produced by the system utilizing data extracted from the integrated data base. Public Works Departments are provided with a broader range of management reports. [14:6-23]

Bubble Nine: Create Reimbursable Bills. Most FAAs provide either labor or materials on a reimbursable basis to activities funded by a separate Operating Budget. In such cases a Reimbursable Work Order (RWO) is established in the FAA's records upon receipt of a funding document from the requesting activity. RWO files are updated in response to charges entering the system through reimbursable job orders. Billings for labor and materials expended against the RWO are produced in this process, and cost data is transmitted from the supplying activity to the receiving activity via the Financial Reporting System. A totally mechanized reimbursable accounting function is maintained by the system. [14:6-27]

Bubble Six: Produce Summary Reports. This process provides weekly, monthly, quarterly, and annual summary accounting reports using data extracted from the IDAFMS data base. All report requirements levied by external agencies are produced dependent upon the unique operational characteristics of the activity. Job cost reports provide information concerning obligations and expenses summarized by optional data elements. These reports are of particular interest to the FAA Comptroller in controlling execution of the annual budgetary plan. Actual obligations on a monthly, quarterly, or year-to-date basis can be compared with budgeted amounts and variances can be identified. These

comparisons can be made not only for aggregate totals, but by different subdivisions including expense element, optional functional elements (functional category/sub-functional category), or organizational subdivisions. [14:6-18] Additional reports appropriate to activities administering Research Development Test & Evaluation appropriations, Non-appropriated Funds, Public Works Departments, Supervisor of Shipbuilding activities, Naval Medical Command facil- ities, and flying hour costs are provided for data captured in earlier processes. The system additionally produces the full range of Uniform Management Reports (UMRs) for the FAA. The UMRs are the standardized resource management reports prescribed for shore-based activities.

2. IDAFMS Data Flow Relationships

The transmission of data between different activities in the IDAFMS network is the one of the factors upon which the success of the entire project rests. This section will examine the types of data transmitted between activities and IDAFMS' interface with a wide variety of activities and Management Information Systems outside the IDAFMS network. The reader should gain an appreciation of the financial information network for which IDAFMS acts as the medium of data exchange.

Primary data flow for the entire IDAFMS network originates at the FAA. Each FAA is provided with several

data transmission terminals suitable for both input of accounting record source data and inquiry of the IDAFMS data base. Accounting technicians are tasked with establishment of obligations for each document processed into the system. This represents a large work load formerly accomplished in most cases by the AAA (normally collocated and operated by the FIPC). Provisions for inclusion of repetitious data elements on the Cathode Ray Tube (CRT) screens of the terminals and extensive editing of input data reduce the difficulty of the task. Even so, the initial provision of data to the system is a formidable task which can benefit greatly from additional efforts to reduce the amount of manual interface with the system.

Data transmission occurs on an interactive basis between the individual FAA and the servicing FIPC. Each original record established at the FAA must pass validation prior to entry into the data base. Suspense reports of records (documents) failing validation are held in abeyance pending correction by the originating FAA. Accounting technicians, supervisory accounting personnel, budgetary personnel and any others holding the proper access code can make a large number of inquiries or request a wide variety of reports via the telecommunications network. A remote batch terminal (RBT) is provided at each FAA in order to receive hard copy of requested reports. It is

envisioned that the system's rapid inquiry-response capability will satisfy the need for individual pieces of data in such a manner as to significantly reduce the number of hard copy reports normally requested.

Design of the IDAFMS data transmission network facilitates real time exchange of data between each of the IDAFIPS subsystems. Part A of this chapter discussed the reliance of all IDAFIPS subsystems on a single data base. Four interrelated subsystems are created primarily for control of the design, development, and maintenance of the application software. The integrated data base is established in IDAFMS because of its necessity to support initial processing requirements. The IDAFMS-OPFORCES, FRS, and CAM subsystems have equal access to and use of each regional data base. Software protocol provides for provision of specified data elements to each subsystem as the data is required.

To this point, discussion of data generated at the FAA, compiled in the regional data base, and employed by each of the four subsystems has been confined to activities and functions operating within the financial reporting network described in Chapter I. IDAFMS has responsibilities to provide financial information far beyond the scope of any previous or existing financial management and reporting system. In addition to the subsystems discussed above,

Figures 10 and 11 represent the activities and Management Information Systems with which IDAFMS interfaces on a recurring basis. Research limitations preclude a full explanation of the data exchanged and its implications. However, the reader can easily grasp IDAFMS' complexity by imagining the design specifications necessary to permit interface with each of these separate activities or systems.

Activities Supported by IDAFMS

NAVCOMPT (NCB)

NAVCOMPTSSA

Naval Medical Command, Geographic Area Commander

Naval Plant Representative Offices (NAVPRO)

Supervisor of Shipbuilding, Conversion, and Repair (SUPSHIP) activities

Inventory Control Points (ICP)

Defense Contract Administration Services Regions (DCASR)

Non-Appropriated Funds activities

Naval Reserve Support Office (NAVRESUPPOFC)

Naval Facilities Command (NAVFAC)

Receipt processing activities for each FAA

Payees of government obligations

Figure 10
Activities Supported by IDAFMS

Information Systems Supported by IDAFMS

Uniform Automated Data Processing System (UADPS)

Material Management System

Management Information System for International Logistics (MISIL)

Construction Battalion Center Supply Management Information System

AMALGAMAN, the Naval Facilities Command accounting system for the Military Construction, Navy appropriation

Standard Reporting and Accounting System (STARS)

Navy Standard Civilian Payroll System (NAVSCIPS)

Automated Procurement Accounting Data Entry System (APADES)

Local interfaces within a FIPC region as determined by the implementation plan

Figure 11
Information Systems' Interface With IDAFMS

D. IDAFMS CONTROL FUNCTIONS

One of the primary objectives of IDAFMS' development is the enhancement of control over assets provided for the operation and maintenance of commands it supports. Control is improved in two aspects; internal control provisions assure proper system performance while management control provisions enhance the command's ability to manage assets.

1. Internal Control Provisions

IDAFMS contains its own network of internal controls. These controls are of two types: internal accounting controls and enhanced management controls for employment by system users. The process of developing these controls involves evaluating edits, validations, and security controls present in the system against NAVCOMPT policies and standards (which encompass and amplify all GAO standards). System assurance controls and auditability factors must also be developed for inclusion in the software. These controls provide assurance of the proper functioning of the system and provide a clear audit trail for each transaction. [10:3]

2. Control Facilitation at the FAA

As noted above, IDAFMS will produce all external reports required by current directives. These reports follow standardized format; their contents are the basis upon which the FAA financial manager takes action to control local functions. Control is exercised through the departmental and divisional managers responsible for the expenditure of resources. It is a process executed by individuals, not by accounting systems. IDAFMS is not, then, a control system; it is an accounting system designed to enhance managers' abilities to control the financial resources

and other assets provided for the accomplishment of the unit's mission.

Internal reports unique to the needs of local financial managers are not standardized under IDAFMS. The ADP technology provided in the system permits the local fund manager to exercise numerous tools and options in order to facilitate more effective control of operating funds and more efficient management of resources. Using on-line inquiry of the activity data base, the FAA financial manager can obtain such management information as specific obligations in locally established cost centers and sub-cost centers, remaining balances, analysis of variances from planned levels of expenditure, and other information which can assist in controlling resources more effectively. [15:II-136]

3. Status of Funds Inquiry

Probably the single most important control function which IDAFMS performs for the FAA is an automatic validation of fund availability for each transaction which obligates the activity's funds. Prior to recording each new obligation in the data base, a comparison is made between the amount of the transaction and the remaining funds available to the activity in a designated General Ledger Account. Any transaction which would cause the activity's cumulative obligations to exceed its authorized obligational authority

is held in suspense, and a message detailing the information is returned to the terminal which originated the transaction. This mechanism prevents inadvertent violation of Title 31, U.S. Code, Section 1517 (formerly R.S. 3679), the public law which forbids the incurrence of obligations or expenses in excess of authorized limitations within an appropriation.

The status of funds in any administrative account established at the FAA can be received on demand. Bubble eight permits the distribution of funding authority as desired by the local activity. Funds can be allocated through a four tier network starting with the cost center and continuing through three sub-cost center levels if desired. Through careful design of the reporting structure and the coding assigned to each fund recipient, the FAA Comptroller and Budget Officer can distribute funds down to the branch level in the organization.

All internal management reports produced by the system can be summarized to the level specified above. Summary reports for higher levels in the organization are produced on demand. Both line managers and Comptroller staff personnel can be provided with data needed to manage their particular functional areas, and the data can be presented and summarized in a manner most suitable to the individual FAA. The control process is facilitated

by IDAFMS' capability to present management information in the manner best suited to its users.

E. SUMMARY

The details and complexities of IDAFMS have been covered in very general terms in this chapter. A knowledge of integrated data base concepts and the role the data base plays in each of the processes is essential to understanding the myriad of functions performed by IDAFMS. Each of the Level Zero processes has been introduced, and the improved aspects of resource control at the FAA have been explored.

IDAFMS development to date is characterized by meticulous attention to detail, employment of a proven methodology of systems design, and active involvement by prospective users. The system cannot satisfy every locally unique report or format requirement. It does provide the FAA with all NAVCOMPT-mandated information, and there are numerous report options provided to assist FAA managers in controlling financial resources. The key the IDAFMS' success, however, does not lie in its design. No automated management information system can be viewed as a success unless its users employ the system to its full capabilities. Training is the primary factor which determines the user's ability to operate and utilize any system. Chapter IV will discuss current plans, alternatives,

and considerations for employing microcomputers throughout the IDAFIPS network and will explore the use of microcomputers in educational and training applications.

IV. MICROCOMPUTER APPLICATIONS IN IDAFMS

A. BACKGROUND

Previous chapters introduced the general operating concepts of Navy automated financial management systems, discussed the evolution of the IDAFIPS project, and provided an overview of IDAFMS' processes, capabilities, and limitations. As designed, IDAFIPS will operate on a real-time, interactive basis; processing in this manner requires terminals to be operated on-line with the host computer located at each NAVCOMPT DPC. Terminals have no requirement to store mass quantities of data because individual transactions are passed to the host as each is entered. Downloading of large quantities of data is accommodated by a Remote Batch Terminal (RBT) provided to each FAA. IDAFIPS' ADP hardware, when coupled with its telecommunication system, is thus self sufficient; no additional supporting equipment is required to execute all prescribed functions.

The microcomputer "explosion" throughout our society has reached nearly every major professional field as individuals explore and discover new methods and applications. The Navy's use of microcomputers, although generally lagging behind the private sector, has experienced a similar exponential growth in the last few years. Navy managers

in fields ranging from weapons system acquisition management to health services are employing microcomputers to collect, evaluate, and manage immense quantities of information. A growing number of Navy financial managers feel that the microcomputer has become a necessary tool of their trade. The apparent exclusion of the microcomputer from IDAFIPS functions may be viewed negatively by managers who have become accustomed to employing the microcomputer on a continual basis.

This chapter will explore the potential use of microcomputers throughout IDAFMS. Three major subdivisions are addressed: applications in financial management under current IDAFMS design, supplemental financial management applications for capabilities not included in IDAFMS, and educational/training considerations for IDAFMS' users. Financial management functions using microcomputers linked to the system under its current design will be explored, including the considerations for FAAs and project managers. Supplemental financial management applications not included in IDAFMS' capabilities are performed with microcomputers at many Navy activities today. These applications will be reviewed and discussed. The chapter concludes with an overview of the employment of microcomputers in educational and training applications and the design considerations for these applications, since a major task facing

the IDA Project Office and NAVCOMPTSSA is the training of field personnel who will interact with IDAFMS.

B. MANAGEMENT APPLICATIONS WITH CURRENT IDAFMS DESIGN

With the rapid expansion in the use of microcomputers in management functions throughout the Navy, a question arises concerning the employment of microcomputers in conjunction with IDAFMS. Many, if not most, financial managers at the local activity, the major claimant, and the headquarters level currently employ microcomputers for analysis of financial data, budget preparation and submission, budget execution, contingency planning, and a host of other applications. Current methodology involves manually extracting data from official accounting reports and loading this data onto microcomputers for analysis. The microcomputer has become a necessary tool for most Navy financial managers, and its importance in assisting managers will only increase with time.

As previously noted, IDAFMS operates on a real time basis in an interactive mode. The network operates on dedicated telecommunication lines from the host computer located at the NAVCOMPT DPC to the IDAFIPS terminals at each FAA. Transactions entering the system from each FAA serviced by the regional FIPC drive the system. Transmission of batch data from the FAA is not possible under current systems architecture. No means is provided to

download locally selected batch data from the host computer, and no interface is included which permits a microcomputer to serve as an IDAFIPS terminal. Some means is needed to download records available in the integrated data base to a microcomputer at the FAA.

A second capability not currently met by IDAFMS is the ability to produce locally designed reports or adapt report format to the specific needs of the fund administrator or major claimant. Microcomputers employing electronic spread sheet and financial analysis software produce management information in a form tailored to each manager's requirements. Standardization throughout IDAFIPS is one of the system's primary objectives. The additional reporting requirements levied by each claimant and the large number of unique capabilities desired by separate FAA personnel cannot be accommodated in any standard system. By downloading selected portions of the FAA's data base to a separate system (i.e., a microcomputer), the local activity is afforded the opportunity to format, analyze, and display its own data in any manner desired.

1. Micro-to-Host Link

Before microcomputers can be employed as an integral part of the IDAFMS network, a telecommunication link between the IDAFIPS hardware and the microcomputers in use at FAAs, major claimants, and headquarters activities must

be established. However, the creation of devices to perform interface functions between the IDAFIPS host, a Burroughs A-9B, and a wide variety of different microcomputers is a formidable task. No commercially available products are currently capable of performing interface functions between the Burroughs host and a microcomputer at the FAA. The wide variety of microcomputers employed at various activities adds additional complexity to the problem. It is unlikely that a single interface device can meet the data flow requirements of many of the popular microcomputers.

Further complicating matters are the technical transmission requirements and limitations of the telecommunication system through which the data passes. The original IDA concept envisioned use of dedicated data transmission lines leased from American Telephone & Telegraph. Divestiture of the corporation, however, has created significant problems in obtaining the required lines when needed and at a reasonable cost.

Another consideration is the employment of the Defense Data Network (DDN), a telecommunications network currently under development by the Defense Communications Agency (DCA). Use of DDN for systems including IDAFIPS has been mandated by the Office of the Secretary of Defense. A waiver from this requirement has been obtained for the first IDAFMS implementation at FAADCLANT, Norfolk,

Virginia. However, all follow-on implementation sites are expected to utilize DDN as the telecommunications link for both intraregional and interregional data transmission. Complicating the use of DDN for transmission of IDAFIPS data is the fact that two separate interface devices are required to create the link, one at each end of the telecommunications line. DCA has issued a contract for development of the interface between Burroughs equipment and the DDN with System Development Corporation, a Burroughs subsidiary. [16:1] No expected availability date for this device has been established at the time of this writing. A second device linking either the Burroughs terminal included in the IDAFIPS contract and/or a specified microcomputer to DDN will have to be produced before a true link can exist. This task is not viewed as a difficult one; many such devices are in use in the private sector today.

Certain considerations must be addressed prior to the use of any micro-to-host link within the IDAFIPS network. First is the control of access to the integrated data base. Security protocol similar to that included in existing system software must be utilized in order to limit data access to authorized recipients. Several layers of security authorization must be included to permit access to various portions of the data base by employees performing separate jobs. Once the data base has been

accessed, records must only be retrieved from it. Alteration of any records residing in the data base will destroy its integrity. Controls must therefore be established to permit batch data transmission on a one-way basis from the host to the FAA. If these controls can be established in the system software, utilization of a micro-to-host link can provide the local activity with a capability not previously available in any Navy financial management system.

2. Intermittent vs Permanent Link

The possibilities opened by the creation of a micro-to-host link appear almost endless when viewed from the user's standpoint. Near real-time access to the tremendous volume of data applicable to each FAA is a luxury never before experienced in Navy financial management systems. The possibilities open to the FAA financial manager seem almost unbounded if a link is made possible. One question which requires resolution prior to the establishment of a link between the IDAFIPS host and any activity microcomputer is whether the link should be an intermittent or permanent one.

A factor which complicates the situation is the large number of microcomputers in use at FAAs, Type Commands, Major Claimants, and Headquarters activities, each of which has need for data processed by IDAFMS. This number

is increasing steadily as managers find new applications and the cost of purchasing new equipment decreases. Obviously, the system software which operates and manages data transmission for IDAFMS is limited to a finite number of terminals. This alone tends to support the notion that any link should be an intermittent one. An individual can gain immediate access if the host computer is not fully utilized by other users; otherwise, some queuing system is required.

A second factor to be considered is the cost to maintain a given terminal "on-line" over an extended period of time. Although it is owned and operated by the Department of Defense, DDN does not provide free service to its users. The cost to maintain a dedicated line from each activity serviced by the NAVCOMPT DPC to the host computer will likely preclude utilization of any terminals which are maintained "on-line" at all times. The specific costs involved and the activities responsible for funding these costs have not been resolved at this time.

The problem of data interface between the host computer and a variety of microcomputers currently in use throughout the activities served by IDAFMS must additionally be addressed. No universal interface mechanism yet exists which can translate data from a number of different microcomputers to a format compatible with DDN. A

separate interface mechanism is currently required for each of the major manufacturer's products. Proprietary considerations have prevented hardware manufacturers from adopting a standard data transmission format. Although each activity can utilize its own interface mechanism, microcomputers made by different manufacturers are frequently used in a single activity. Additionally, the activity has no desire to be tied to a specific manufacturer's products in any future procurements.

Some activities would prefer to employ microcomputers as an input device in addition to its role as an analysis tool. As noted above, data transmission should normally be limited to a one-way flow from the host computer to the activity. This limitation is fine for analysis work, but will not permit a microcomputer to be utilized in place of the designated IDAFIPS terminals. A major deficiency inherent in these terminals is their limited storage capacity. The current configuration permits storage of only four screens of data within the terminal, thus requiring the terminal to be operated on-line with the host. The on-line validation of data entered by each activity further necessitates this type of configuration. The costs of DDN utilization noted above will likely make employment of these particular terminals and this processing methodology very expensive. Development of the capability

to validate transactions within hardware at the local activity, most likely by reconfiguration of the remote batch terminal, will allow off-line operation until the data is transmitted to the host. If interface devices discussed above are developed to link the activity's microcomputers to its remote batch terminal, the utilization of any microcomputer as an IDAFMS terminal is a realistic possibility.

3. FAA Considerations

The potential employment of microcomputers in the IDAFMS network lends a significant degree of flexibility to the manner in which FAA financial managers execute their responsibilities. Readily apparent to managers and supervisors is the flexibility of scheduling afforded the local activity. Although IDAFMS is designed to operate on a twenty-four hour basis, most user activities operate during standard daytime working hours. Employment of microcomputers in addition to the terminals provided with system results in more work stations for data entry or analysis work. Although the host hardware is designed to be available at all times, technical difficulties will inevitably interrupt service. Utilization of the microcomputer off-line permits data entry or analysis to become somewhat independent of the host. After data is downloaded from the host, analysis work can be performed whenever the user deems

necessary. Similarly, data can be entered in a microcomputer according to the user's particular schedule and transmitted in batch at the end of the day.

One large consideration for the FAA is the potential for microcomputer usage in a training role. New personnel can be indoctrinated in a host of subjects, including IDAFMS processing, and can develop the knowledge and skills necessary to perform many jobs by employing microcomputers and Computer Based Instruction (CBI), both of which are discussed later in this chapter. Although the microcomputer is not viewed as the answer to all training needs presented by IDAFMS, it is certainly an extremely valuable tool which can aid the local activity's training program immensely. Closely aligned with initial training is the potential for remedial/refresher training using the microcomputer. This type of training is needed in every activity. Unfortunately, it is frequently ignored. Microcomputers can be employed as a remedial training aid in a manner similar to initial training. The planned use of microcomputers in IDAFMS implementation training will be discussed in Chapter V.

Probably the strongest consideration for utilization of microcomputers in IDAFMS from the FAA standpoint is the ability to reconfigure standardized output formats to the specific needs and desires of local management. Every

field activity has its unique style of managing the financial resources provided by higher authority. This management style is often mirrored in the format and type of reports employed to formulate and execute its budget and to manage specific cost categories. Although many contingencies are included in the IDAFMS application software, every desire of the local manager cannot be met. Use of the microcomputer permits restructure and summarization of individual data elements in a format desired by management. New or revised requirements and/or desires can be accommodated by alteration of the microcomputer software, a relatively simple task compared with the complexity of making changes to highly integrated systems such as IDAFMS. With the ability to configure local management reports, activity managers should feel that they control the financial reporting system instead of being constrained by it.

4. Project Management Considerations

Considerations for the employment of microcomputers in IDAFMS are significantly different when viewed from the project management perspective. The IDA Project Office and NAVCOMPTSSA share responsibility for all initiatives impacting on IDAFMS; these considerations are thus viewed as a joint concern of both.

Of primary importance to the success of the entire IDAFIPS system is the successful implementation and operation of the initial IDAFMS site at FAADCLANT in Norfolk, Virginia, in October, 1985. As discussed in previous chapters, the project has been under development for over ten years. An operational system which conforms to the specifications set forth in the design documentation is crucial to further development efforts. A tight, but achievable, implementation schedule is established and will be discussed in Chapter V. This schedule, coupled with follow-on implementations at each of the regional sites, prevents any major initiatives from being added to the project at this time. It is unlikely that steps to provide capabilities beyond the link between Burroughs hardware and DDN will be initiated until the system is operating at several sites. Only then will additional enhancements to the system be given serious consideration.

When developmental efforts are initiated to include microcomputers in IDAFMS processes, the IDA Project Office and NAVCOMPTSSA will necessarily play a major role in shaping future policy. As has been the case throughout the current development period, standardization of software will be one primary objective. The utilization of a wide variety of microcomputers in the activities serviced by IDAFMS presents special challenges to software developers,

especially if these equipments are employed to send data to the host. If the microcomputer is employed strictly as a tool for off-line analysis of data, the requirements for standardization can be reduced to a minimum.

The desirability for standardization and the specific desires of major claimants served by IDAFMS may possibly be at odds over the employment of microcomputers by the claimants and their subordinate activities. Several claimancies have purchased and distributed microcomputers to their field activities for the specific purpose of meeting claimant-mandated reporting requirements. Since IDAFMS will not meet these demands, claimants intend to manage operations with IDAFMS data <u>after</u> it has been reformatted and summarized by claimant-supplied software. The IDA Project Office is in no position to mandate reporting requirements to the claimants, but it also cannot support development of non-standard applications. The resolution of this dilemma is a key factor in the struggle to incorporate the power and versatility of the microcomputer into IDAFMS.

Despite the widely accepted fact that the microcomputer is now an integral tool to most Navy financial managers, there are limitations in the support which the IDA Project Office can (and should) provide. The scope of responsibility for the project certainly includes

development of an operational system as set forth in the Detail Design Manual, but the limits of this responsibility are not easily defined. FAA managers tend to view the Project Office as having ultimate responsibility for all system support. Claimants are willing to provide support only when their specific requirements are not fulfilled. The Project Office has taken an open-minded view of its support responsibilities to date, but this backing will diminish quickly under funding shortages. The key to continued aid lies in aggressive action by the claimants and the FAAs to build mutual coalitions in support of standard microcomputer applications for IDAFMS data. A unified effort without consideration for proprietary interests will likely result in the support needed to employ the microcomputer to its full capability within the IDAFMS network.

C. SUPPLEMENTAL FINANCIAL MANAGEMENT APPLICATIONS

In addition to the potential uses of the microcomputer in direct support of IDAFMS functions, there are several supplemental applications which support both financial and general management considerations at activities served by IDAFMS. These activities are closely tied to the functions normally performed by financial managers at FAAs, major claimants, and headquarters activities. Any evaluation of the potential use of microcomputers by financial managers

at these activities should consider the applications discussed in the following paragraphs.

1. Networking

Microcomputer networking is a growing trend in both the private and public sectors as organizations realize the power of information exchange in a local area network. This interconnected chain of microcomputers with software which facilitates transfer of data between individual processors has enormous potential for Navy financial management organizations of all types. A central data repository can be accessed by all authorized users of each system in much the same way as FAAs access the IDAFIPS data base. Analysis of data can be performed using a wide variety of commercially available software, and results of analysis can be transmitted between work stations. There are certain physical limitations to all local area networks, but these limitations will not restrict the type of intra-command applications needed by most activities.

Headquarters activities have taken the initiative in networking as a means of providing oversight for their geographically dispersed subordinate commands and the large number of programs executed by these commands. Enormous quantities of financial and performance data are provided routinely as part of the Navy's budget submission, justification, and execution process. Automated means

of maintaining and analyzing this data are an absolute necessity. The employment of networks permits managers and analysts to share pertinent information quickly and effectively, thus making optimum use of these individuals' time.

Major claimants and sub-claimants (Type Commanders/ Systems Commanders) are also employing networks, but to a lesser degree than headquarters activities. The amount of data handled by financial managers at these levels, while still large, does not compare with that managed by higher activities. Organizations are smaller and all employees are usually located in close proximity to one another. Even so, traditional manual analysis of performance data submitted by Expense Operating Budget (EOB) and Operating Target (OPTAR) holders is being replaced rapidly by microcomputers with specially designed software. Networks permit rapid distribution of the results of financial analysis and direct comparison of different analyses performed at different times. The claimant will have even more incentive to employ networking when IDAFIPS becomes fully operational. The Claimant Accounting Module can provide data from each of the FAAs on a near real-time basis, thus permitting much closer monitoring of local financial activity. More frequent and closer analysis of FAA performance will necessitate networking to

adequately disseminate this information within the claimant's staff.

FAAs can additionally benefit from networking, but not to the degree noted for headquarters and major claimants. The smaller financial management staffs at the FAAs and their management of a limited number of EOBs and/or OPTARs decreases the need to create networks within the financial management function. However, networking can be employed effectively on a command-wide basis in order to transmit and share both financial and general management data throughout the command. This is a similar application to that used in the private sector. Different functional managers are tied to a common network in order to share information which facilitates management of the total organization.

2. Budget Submission

By employing microcomputers at each command throughout the financial reporting chain, the exceptionally complex task of annual budget submissions (for the O&M,N and O&M,NR appropriations) can be executed more effectively and accurately than by manual means. IDAFMS does not contain any comprehensive budget development package. However, process eight permits the establishment of funds and allocation data which can be of significant value in formulating budget submissions. Summary reports from IDAFMS can be

produced based on the cost categories (functional/sub-functional category, cost account code, element of expense) upon which the activity's budget is based. Although summary of past financial data does not suffice for future requirements, this data can form the basis for further development. The microcomputer can employ data provided from IDAFMS, add new resource requirements, consider inflation factors, and incorporate specified guidance from higher authority to produce projected budget requirements. These requirements can then be reviewed by all affected parties and necessary revisions made prior to finalization. The data can then be formatted as required and initial budget submission packages can be produced. The preparation and submission of annual budget requests is much more complex than this description would suggest. The microcomputer can play a major role in effective management of the budget formulation process.

3. Budget Execution

Paralleling the employment of microcomputers for budget formulation is their use in monitoring the execution of the annual budget for each appropriation managed by the activity. IDAFMS can provide raw data concerning obligations and expenses in each cost category and can make comparisons against planned amounts in each category. It cannot, however, perform analysis of the data, evaluate

the effect of redistributions, or make projections based on current trends.

The microcomputer's use as a tool for monitoring execution of the FAA's EOB/OPTAR and the major claimant's expense limitation is increasing faster than any other Navy financial management application. The increasing complexity of management requirements levied by higher authority and the numerous administrative limitations of the usage placed on certain funds cause many activities to rely almost exclusively on microcomputers to perform analysis and monitoring functions.

Closely aligned with budget execution is the ability to perform contingency planning for the current budget. Changes in an expense limitation, expense operating budget, or OPTAR are common events, and both the FAA and major claimant need the capability to assess the impact of funding decrements or increments on their budget execution plan. The microcomputer meets this need with relative ease. Electronic spreadsheet and data base management software packages can analyze almost any contingency in a matter of minutes. Potential reallocation of resources can be examined in a simulated data base to determine the effects of various actions. The additional resources needed to meet a specific contingency can be estimated based on simulations, and appropriate justifications can be prepared.

Software to permit the type of analysis needed for budget execution monitoring and contingency planning is readily available in the marketplace. Specially designed software for use with the entire IDAFIPS system could be developed by any number of central design agencies, most notably NAVCOMPTSSA. Employment of the microcomputer in this role will increase steadily as more activities experience the benefits of fast and accurate data analysis.

D. EDUCATION AND TRAINING CONSIDERATIONS

The related fields of education and training have benefitted immensely from the evolution of the microcomputer and its supporting software systems. Cooperative efforts on the part of educational theorists, professional educators and trainers, software developers, and ADP hardware designers have resulted in a wide variety of educational and training materials specifically designed for use with microcomputers. These materials have evolved from projects to develop computer based instruction (CBI) and computer assisted instruction (CAI) which date back to the early 1960's.

1. Computers in Education

A detailed anthology of research and development efforts in CBI is given by Kearsley, Hunter, and Seidel in a series published in 1983. The major finding resulting

from extensive research surrounding CBI is expressed by the authors in the following quote:

> We have ample evidence that computers can be used to make instruction more effective and efficient in a variety of different ways. We know that computers can make the learning experience much more exciting, satisfying and rewarding for the learner and teacher. It is clear that computers do not stifle the creative process, are not dehumanizing and do not foster anti-social development. However, we have learned that none of the potential benefits of CBI are inherent in CBI: they all hinge upon the dedication, persistence, and ability of good teachers and courseware developers. So while CBI has reduced the dependence of instruction upon the quality of human effort to some extent, it still remains the major factor in the successful or unsuccessful use of computers for education.[17:94]

The benefits derived from the use of computers in educational applications are thus dependent largely on the professional expertise of CBI courseware developers and the educators who administer it. Mutual collaboration is required if high quality courseware is to be developed. "The challenge to educators is to share their knowledge concerning how individuals learn with programmers. The challenge to programmers is to share the unlimited possibilities of the computer with educators. The challenge to both groups is to be receptive to each other, to study new information, and to collaborate harmoniously." [18:530]

2. Learning Styles

Specific considerations employed by the courseware designer can lead to more effective results from the training. Basic considerations for design are centered in

understanding how individuals learn. Some of the more important considerations include the following:

-Learning is change. A good design should be self-conscious about how people change.

-Learning is accelerated by reducing restraining forces. The design needs to focus on reducing restraints rather than advancing drivers.

-People have different learning styles. Some learners are interactive, some reflective; some like structure, some resist it; some need to feel good to learn, some are challenged to learn by new thoughts. A good design will allow for different styles and not be a projection of the leader's own style.

-People learn best when they have some control over the pace and depth of the learning process. Share control by making directional suggestions, allowing "outs" and by believing yourself that avoiding is not all bad.

-Transfer of learning depends on how similar the experiences are to the situation back home. The more similar, the easier transfer is. Do your homework, interview, plan with participants, and use actual situations.

-People pursue satisfaction of their own needs with great enthusiasm. Apathy is the result of people being asked to pursue someone else's goals. Hook people up with their own needs early in the design. [19:64-65]

Each of these factors requires careful consideration by the designer, since the design parameters form the supporting structure of every piece of courseware.

3. Adult Learning

Of particular importance in the development of courseware to support a system such as IDAFMS is the adult population at whom the training is targeted. Additional

factors which should be considered by designers include educational background, amount of work experience in the field, the specific nature of work experience, the amount of previous interaction with computer systems, and the skill level required to perform effectively. A detailed understanding of the target population and its preferred learning style is paramount to the success of any CBI design. One author appropriately summarizes this point: "If the microcomputer movement is to have any success in adult education, programmers who develop microcomputer programs for adults must be more creative and more consistent with how adult education research suggests learning takes place. [20:61]"

4. Framework for Effective Design

The framework for an effective CBI design can be developed in four key areas: transfer, interactivity, problem solving, and stimulation.

- Transfer, the flow of knowledge from the instructional medium to the student, is facilitated by bringing organizational and real world situations into the learning experience. The student learns best by studying actual situations faced in the environment.

- Interactivity both enables and requires the learner to become involved with learning. It does away with the similarity to reading a book evident in earlier computer-assisted instruction. The context is conceived as an interactive flow, so the design is planned around interactivities, not words. Generally, there should be no more than three text screen without interactivity.

-Problem solving is the highest intellectual skill according to most learning theorists. Effective CBI is designed to enhance problem solving skills, but design of interactivities at the problem-solving level requires rigor and creativity. Training designers and developers with practical organization experience and technical skill are best suited for the task.

-Stimulation interests the the learner, personalizes the learning experience, and creates a positive atmosphere. Screen design and attractiveness is particularly important. Sentences should be concise. An outline format should be used where appropriate. Appealing and easy-to-read type is a necessity. Stimulation flows from the use of realistic and relevant situations; use examples the learner can identify with. Diagnostic tools such as post-session tests (with norms) have a particular impact because something new is revealed to the learner about himself. [21:40-41]

By employing a framework similar to this one and giving appropriate consideration to the factors noted above, the courseware design team is more apt to produce a product which meets the needs of its users. The initial design, however, requires testing and revision prior to release for its intended use. "Any training/learning design must incorporate certain principals and procedures if it is to have any hope for success, but it is all too easy to take them for granted. It is just as important to understand what went wrong as it is to know what went right, to make use of the insight that can be gained through immediate program evaluations and through retrospective analysis of past efforts." [19:66]

5. Considerations for IDAFMS

There is little doubt that CBI will be employed in the training programs that support IDAFMS; an estimated total of 4200 managers, supervisors, and technicians must be trained during system-wide implementation. [22:I-1] Given that use of the system requires interaction with a terminal, it appears natural to utilize CBI as an integral part of the training program. Personnel responsible for the development of these training programs must give appropriate consideration to the issues addressed above if the programs are to train system users effectively.

The development and maintenance of IDAFMS training programs, including documentation and support materials, is a responsibility currently executed by the IDA Project Office. Any new development efforts in support of microcomputer applications will fall naturally to the Project Office for coordination and funding. Design and development of CBI is an expensive proposition, and the availability of funding for such an effort is always questionable. Even so, these costs are largely front-end loaded; incremental maintenance costs over a period of years are relatively small. If NAVCOMPT is willing to fund development of these and related financial management training initiatives, the microcomputer can play an instrumental role in training employees of all grades in a variety of critically important

subject areas. Potential candidates for additional financial management training will be recommended in Chapter VI.

E. SUMMARY

Employment of the microcomputer at every level of Navy financial management is increasing steadily as more managers become aware of the microcomputer's capabilities and as the cost of ownership decreases. Many managers rely almost entirely on the microcomputer to collect, store, analyze, and summarize the financial data necessary to support the decision making process. There is no doubt that the microcomputer will continue to play a vital role in managing financial resources at all types of Navy activities. This chapter has discussed the employment of computer resources in education and training programs and has reviewed the primary factors to be considered when undertaking development of computer based instruction. The potential employment of microcomputers within IDAFMS were reviewed and evaluated. Supplemental financial management applications have been addressed as further support for the integral employment of microcomputers within the IDAFIPS network. After the implementation plans for IDAFMS are introduced in Chapter V, applications of the microcomputer in the implementation training process will be discussed and evaluated.

V. IDAFMS IMPLEMENTATION

A. INSTALLATION AND IMPLEMENTATION PLANS

Previous chapters have introduced IDAFIPS as a fully integrated financial management system, described and evaluated many of the functions performed by IDAFMS, and evaluated the potential use of the microcomputer in IDAFMS applications. Chapter IV noted that the necessity to implement IDAFMS at FAADCLANT in October, 1985, precludes any major enhancements from being added to the design at this time. Many of the potential applications for microcomputers discussed in Chapter IV will undoubtedly become active projects for the CDA in the near future. All energy at this point, however, focuses on implementation at FAADCLANT, the first system to employ live data from all of its supported FAAs.

1. Background, Purpose, and Scope

No implementation of the complexity inherent to IDAFMS can be accomplished without a detailed plan. Personnel at both the IDA Project Office and at NAVCOMPTSSA recognize a need for standardization in implementation efforts just as standardization is a key factor in the design effort. The fact that the FIPCs will be supported by thirteen identical NAVCOMPT DPCs provides the opportunity for standard installation and implementation throughout

the IDAFMS network. With both the need and the ability to utilize a standard approach as a foundation, the IDA Project Office and NAVCOMPTSSA collaborated to produce a document embodying standardized principles of system implementation. The IDAFMS Installation and Implementation Plan (I/IP) resulted from this effort and was published in July, 1983. [3:1-2] Stated in succinct terms, the document's purpose is:

> to provide the methodology and plan of action required for the installation and implementation of the IDAFMS systems within CONUS and Hawaii. This Installation and Implementation Plan (I/IP) will formulate the procedures and timetables required to effectively insure the emplacement of the procured hardware and the achievement of IOC (initial operational capability) for the completed system. [3:1-4]

This purpose statement sets the tone for the remainder of the document; it is procedurally oriented with a heavy emphasis on timetables to assure completion of each major step within the necessary timeframe. Figure 12 provides an abbreviated view of the time-sequenced events discussed in this section.

In a similarly succinct manner, the scope of the I/IP addresses only those areas of direct concern to the FIPC and its supported FAAs. The plan is limited to the major areas of systems development, hardware acquisition, software design, data base conversion, site preparation, equipment installation, acceptance testing, user training, and cutover to production status. [3:1-5]

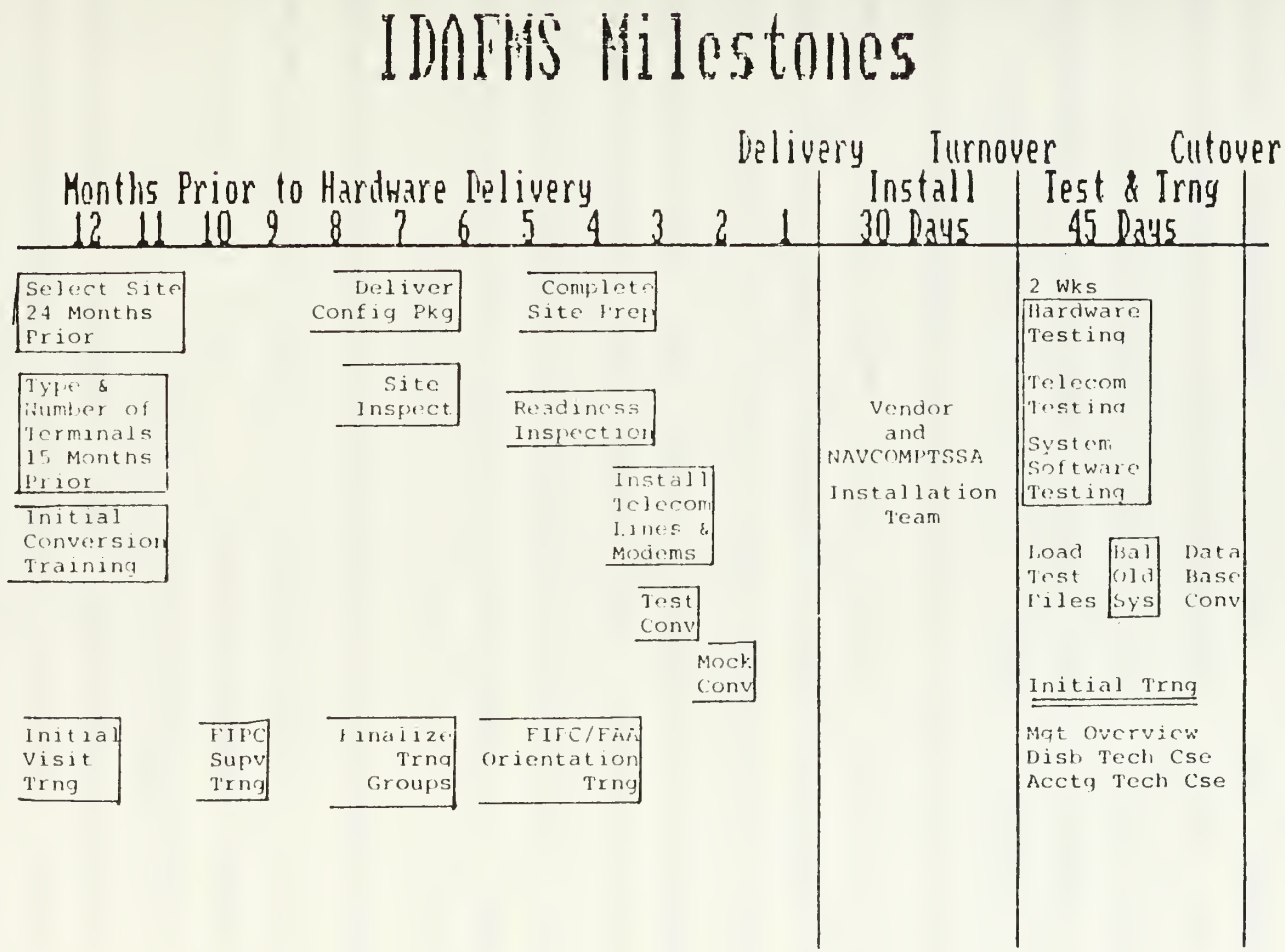

Figure 12
IDAFMS Installation and Implementation Milestones

2. Interaction With Regional I/IPs

The I/IP gives early recognition to site-specific factors which will undoubtedly surface during the implementation process. These factors are addressed in regional I/IPs produced for each site implementation. To assist in the standardized development of regional plans, NAVCOMPT provided detailed questionnaires to each FIPC in order to gather information concerning site-specific variables. Included in these variables are such factors as: local software options, unique processing requirements, external interfaces, FIPC functional operations (before, during, and after implementation), regional training programs, output distribution requirements, RBT and CRT locations, creation of training facilities, and equipment distribution. After information concerning these and any other unique factors is provided to NAVCOMPTSSA, a plan more closely tailored to the unique needs of each FIPC is developed. The Regional I/IP for region 4F (FAADCLANT) will be reviewed later in this chapter. [3:1-5]

3. Site Selection and Preparation

The installation and implementation process is most easily viewed as sequential process involving four major areas: site selection and preparation, hardware installation, software installation, and training and development. It should be recognized that these areas

are not mutually exclusive; implementation steps in one area impact on steps in another area more often than not. For ease in discussion, however, each area is addressed separately in the following paragraphs.

Since each DPC exists solely for the operation of NAVCOMPT-sponsored systems, site selection and preparation are accomplished from a viewpoint of creating a facility dedicated wholly to financial processing. An assessment of the system's expected workload was conducted at each FIPC in 1980. From analysis of the data obtained, certain physical site requirements have been developed. By creating a facility which meets these requirements (square footage, electrical power, air conditioning, auxiliary power), each DPC is assured that current and projected systems' workload can be met without unnecessary complications. As noted in Figure 12, site selection is required twenty-four months prior to hardware delivery in order to permit sufficient time for remodeling or construction work. A generic set of site specification plans has been developed and is to be employed during the preliminary construction phases. Once configuration of a generalized computer room facility which meets the requirements noted above is complete, the contractor is provided with a set of site specific plans which include hardware placement, power and air conditioning requirements, and

work flow considerations. This "configuration package" is delivered six months prior to hardware delivery. At the same time CDA personnel inspect the site, assess the likelihood of on-time completion, and finalize formation of groups for training. [3:2-5]

4. Hardware Installation

Hardware installation in the I/IP is segmented in separate plans for user hardware, site hardware, and pre-exportation testing. The type and number of terminals, printers, remote batch terminals (RBTs), and communication lines required by users at the FIPC and at each supported FAA are determined from workload indicators. This information is provided to the FIPC and FAA beginning fifteen months prior to hardware installation. A Terminal Site Survey aids the user in determining modifications (if any) at the site to accommodate installation of all terminals, printers, and RBTs. This survey permits determination of precise equipment location and communication line connections and cable length requirements. User site preparation must be complete at least three months prior to hardware installation, and a readiness inspection is conducted by the Site Manager to assure that each user is ready to accept its hardware. Communication line requirements are critical to installation at every site. Telecommunication Service Requests for the entire region must

be submitted early in order to receive required lines at least two months prior to hardware installation. The lead time for this action is likely to increase if the Defense Data Network is not employed exclusively for intra-regional communications. All data terminal equipment and modems must be installed two months prior to system start-up to permit a complete test and verification process at each user activity. [3:3-1,3-5]

DPC hardware installation is accomplished in accordance with a strict schedule published in the I/IP. Fifteen hardware suites will be installed in approximately thirty-two months by a joint effort of vendor installation specialists and CDA installation teams. The vendor is responsible for delivery and installation of the physical components of each system. CDA personnel will assist in hardware installation and perform system software testing during a thirty day period after the equipment is operational. Each system will undergo acceptance testing via a series of in-house performance diagnostics which measure (with predictable results) the internal operation of the overall computer system. Rigorous performance testing in a saturation mode over a following six week period when user training is taking place will provide insight into the system's reliability, maintainability, and availability. "The system is contractually obligated to achieve a 95 percent uptime

ratio with no more than 5 percent (of the 100 percent available) being credited from operations in a degraded mode." [3:3-12]

The acceptance testing noted above requires employment of software for conversion and exportation testing which is developed for the hardware system by the CDA. Two separate facets of the IDAFMS conversion and exportation process must be tested prior to implementation in any region. First, IDAFMS application software must be shown to be free of logic and syntax errors and in compliance with NAVCOMPT-specified accounting and disbursing requirements. Secondly, the data base conversion effort must be tested to insure that each activity's records have been properly and completely converted to the IDAFMS data base. A Systems Demonstration Test (SDT) is conducted on the CDA IDAFMS hardware suite at the NAVCOMPTSSA Detachment in Memphis, Tennessee, prior to exportation. Upon successful completion of the SDT, the software is certified and employed to conduct a mock conversion of each region's total data base prior to actual live conversion. Once the mock conversion data is fully tested in the safe environment of the CDA hardware suite, the balanced, cleaned, and converted files can be loaded onto the newly installed hardware and system cutover can occur.

5. Software Installation

Software installation within each region is primarily concerned with data base conversion and the introduction of IDAFMS application software at each site. Data base conversion follows a specified set of steps for each site. An initial training visit is conducted by CDA personnel at the receiving site approximately one year prior to hardware delivery to provide instructions for effecting conversion of existing files (which vary from site to site) to required IDAFMS formats. Using a conversion procedures manual, the FIPC restructures its procedures, data base structures, interface programs, and balancing procedures to meet IDAFMS requirements. First-line supervisors from the FIPC receive advanced training at the CDA, participate in creation of their activity's master files, and observe the testing of data base conversion programs on these files. A three month corrective action period ensues to permit the FIPC to adjust either the data base or the conversion programs to conform with IDAFMS requirements.

A second test of the data base conversion programs occurs three months prior to hardware delivery. Any final discrepancies are rectified, and the mock conversion noted above is conducted one month prior to hardware delivery. During this mock conversion:

> A general ledger, all required detail ledgers and documents will be generated and a proof of balancing will be conducted by the CDA. The results of the mock DB conversion and balancing will be given to the FIPC, the FIPC's major claimant and NAVCOMPT. Based on this test, the CDA will issue a recommendation to NAVCOMPT to either proceed with the installation and conversion or require that more testing and another mock DB conversion be attempted. [3:4-5]

Performance of the mock conversion assures that the FIPC is fully prepared to proceed with implementation without data conversion difficulties, the largest potential pitfall of any new implementation process.

Site conversion to IDAFMS application software begins when the thirty day vendor installation period has ended. As indicated in Figure 12, the implementation is now in its forty-five day test and training period prior to on-line production. All applications programs are loaded and initial tables and files required by the application software are created by the CDA installation team during the first two weeks of this period. Concurrent with these actions, hardware performance testing, telecommunications testing, systems software testing, and loading of the training data base is taking place. Data base conversion takes place through a highly disciplined approach at the first end-of-month condition during the final weeks of forty-five day test period. Specific steps in the conversion process are detailed in the I/IP. [3:4-6]

6. Contingency Planning

A good plan should consider the possibility of implementation difficulties. Contingency procedures included in the I/IP provide for close monitoring of the entire conversion process. The most critical factor to monitor is the balancing of the old data base prior to employing this data in "live" IDAFMS processing. A batch process used only in conversion is employed to capture all new transactions entered by FAAs and the FIPC; the tape or disk mediums used for storage of this batch data must be compatible with either the old or new (IDAFMS) computer systems. The backlog is processed after the converted data base is balanced. Once the backlog is entered in the system, normal interactive processing begins.

To guard against the effects of an aborted conversion, the old system will remain on-line. If difficulties are encountered in balancing the conversion data base, "the conversion effort will be permitted to continue until the transaction backlog facing the new (or old) system is too voluminous to permit its entry and compilation in time to meet NAVCOMPT financial reporting requirements." If balancing is not complete, a formal meeting will be conducted on the fourteenth day of conversion to assess the FIPC's ability to meet financial reporting requirements. Chaired by NAVCOMPT and composed of the FIPC Commanding

Officer or Manager, the CDA conversion team leader, the Site Manager, and the Remote Site Division Director, this group may abort the conversion or grant a continued grace period if warranted. If the conversion is aborted, the FIPC will reestablish processing support from the old hardware system, process the backlog transactions held in batch, and continue to operate under the old system until a future conversion is successful. [3:4-9]

7. I/IP for IDA Region 4F

The numerous actions discussed above are included in the I/IP published by NAVCOMPT for use at all implementation sites. The specific requirements uniquely applicable to each particular site are set forth in that region's I/IP, a separate document based on compilation of site surveys and numerous other data from the regional FIPC and its FAAs. IDA Region 4F at FAADCLANT is the first activity to utilize a regional I/IP. The document was developed by a private contractor which is actively engaged in support projects for IDAFMS. The final draft of the I/IP, dated December, 1984, was reviewed; its contents are discussed in the paragraphs that follow.

FAADCLANT's I/IP "is designed to function as a highly useful management tool, documenting not only the specific implementation steps, but also the responsibilities of and coordination required by all affected activities."

The plan is extremely detailed, assigning each specific task to one activity, noting required starting and ending dates, and delineating both preceeding and subsequent required steps in the process. The I/IP is more than a programmed set of steps that lead to implementation. It provides a comprehensive discussion of the steps involved in each functional area and supplies the background information necessary for each activity to execute its responsibilities effectively. The plan "incorporates the actions associated with the installation of the hardware, software and telecommunications systems with those more site specific considerations pertaining to functional operations, external system interfaces and local unique processing requirements." [23:2]

Following a detailed methodology which included review of existing documentation, analysis of data from site surveys noted previously, and collection of additional information specific to FAADCLANT's applications, the developers evaluated FIPC interfaces with the FAA to identify unique functions and processes which must be accommodated during implementation. The results of these studies were incorporated into a plan which includes the functional aspects of systems conversion; a Plan of Action and Milestones (POA&M); and information concerning the specific requirements of computer hardware emplacement, installation

of terminals/printers/RBTs, supporting telecommunications networks, and plans for a comprehensive field training program. Once the plan was established, a preliminary draft was written and submitted for review to NAVCOMPT, CINCLANTFLT, and FAADCLANT. Comments and suggestions were incorporated in a final draft which was again reviewed prior to publication of the the approved document. Out of this process, a skeleton I/IP for use at other FIPCs was developed, and a data base was created for use in storing data collected during I/IP formulation. Both of these actions will permit subsequent I/IPs to be developed in shorter periods and with less manpower. [23:1-6-1-8]

The I/IP document is divided into separate plans for different functional areas. Although the plans are addressed separately, each interacts with the others to form a contiguous whole. The following is a brief description of each plan:

- -The Functional Plan highlights specific transitional operations required by both FAAs and the FIPC.
- -The Telecommunications Plan assures that all terminals and data communication equipment necessary to support intraregional processing is in place and operating within design parameters.
- -The Automatic Data Processing Equipment (ADPE) Plan includes steps for determination, installation, and testing of hardware at the FAAs. Actions noted in the general I/IP are redefined in the detail necessary to effect a smooth transition to IDAFMS hardware.

-The System Demonstration Testing Plan consists of two phases during which IDAFMS hardware and software are jointly tested to assure proper functioning. The Developmental Test and Evaluation is conducted on the Memphis host computer suite to demonstrate that IDAFMS satisfies all technical requirements levied by NAVCOMPT and higher authority. The Operational Test and Evaluation demonstrates that IDAFMS meets the operational requirements of its users. It is conducted on the Norfolk host computer using live data and data bases from FAAs serviced by FAADCLANT.

-The Data Base Conversion Plan covers steps required to effect conversion of the existing data base to the IDAFMS data base in detail.

-The Training Plan specifies responsibilities for funding, development, and execution of training programs in support of IDAFMS users. Training requirements, curriculum, training site preparation, and the process for initial user training and follow-on training are specified. This program is discussed and evaluated in greater depth in the next section.

In its final form the IDA Region 4F I/IP is a functional, complete, and exceptionally useful document. Without such a detailed plan which considers literally hundreds of factors unique to FAADCLANT, the installation and implementation process could never be accomplished within prescribed timeframes.

B. IDAFMS MASTER TRAINING PLAN

Responsibilities for formal training in the Navy are specified in OPNAVINST 1500.8 series. Each project manager is charged with the development of a formal Navy Training Plan (NTP) which specifies the activities responsible for development and administration of training in support of the project. The NTP sets forth the technical program

data, billet and personnel requirements, specific training course requirements (including topical outlines), and training logistic support requirements necessary to execute effective training policies and programs throughout the life of the project. Separate NTPs are produced for each of the IDAFIPS subsystems; these NTPs are collectively published as the IDAFIPS Master Training Plan. The NTP for IDAFMS is analyzed below.

1. Responsible Activities

As the project sponsor, NAVCOMPT (NAFC-62) is charged with overall funding, development, and oversight functions for training associated with IDAFMS. In a manner similar to support for IDAFMS hardware and software, NAVCOMPT is responsible for life cycle support of the training function. NAVCOMPT is tasked to execute the responsibilities outlined in Figure 13.

-Act as Project Sponsor for all training programs. In this role, ensure that NAVCOMPTSSA identifies training requirements, plans, coordinates, and conducts user training.

-Exercise review and approval authority on policy issues concerning IDAFIPS training development.

-Review and approve all training plans.

-Identify resource requirements for programming purposes and budget programmed resources.

-Ensure that both initial and follow-on training is conducted effectively.

-Provide funding for technical documentation and support materials for initial and follow-on training. [4:4]

Figure 13
NAVCOMPT Training Responsibilities

NAVCOMPTSSA acts as the System Manager for the entire IDAFIPS project. As such, certain responsibilities normally incumbent on the project sponsor are delegated to it. These responsibilities are outlined in Figure 14.

-Coordination of training site selection and preparation, and training equipment installation at each FIPC.

-Development and update of training plans for each IDAFIPS subsystem.

-Provide guidance and monitor performance of necessary contractors during development and implementation of training programs.

-Maintain close contact with major claimants and FIPCs concerning training plans and programs.

-Provide follow-on training programs for use throughout the life cycle of each subsystem and maintain these programs. [4:5]

Figure 14
NAVCOMPTSSA Training Responsibilities

The Project Manager's responsibilities cover a broader range than any other single activity. These in no way supplant NAVCOMPT's oversight of the training process,

but they require active involvement by NAVCOMPTSSA on a recurring basis.

Seven major claimants will be supported by IDAFMS processes. These include NAVCOMPT, COMNAVSUPSYSCOM, CINCLANTFLT, CINCPACFLT, CNET, COMNAVFACENGCOM, and CNAVRES. As the expense limitation holder for activities supported by a FIPC, the major claimant has a direct interest in training programs which impact on the management of its funds. In this regard, certain policy and funding responsibilities are assigned directly to the claimant. These include a liaison role with NAVCOMPT and NAVCOMPTSSA to ensure that training requirements are satisfied and that adequate training facilities and equipment are provided at the FIPC. The claimant is additionally charged with funding the travel costs of remote site personnel under its claimancy who are sent to the FIPC for training. [4:5]

The individual FIPC is the major "hands-on" activity in the training process. The entire training program is centered at the FIPC, and training sites are located at or near the FIPC. Each FIPC is charged with:

-Designation of a training coordinator who will oversee all IDAFMS training-related activities for the FIPC and its supported FAAs.

-Maintaining close liaison with the NAVCOMPTSSA training manager.

-Providing adequate facilities and equipment for initial and follow-on training.

-Coordinating initial user training schedules.

-Planning, coordinating, scheduling, and conducting follow-on user training using NAVCOMPTSSA provided training packages.

-Ensuring all FIPC and FAA personnel requiring training are scheduled expeditiously. [4:6]

Collectively the FAAs supported by IDAFMS employ the majority of personnel who require training, both initially and for follow-on purposes. The FAA has no direct responsibility for conducting officially sponsored IDAFMS training at this time. No doubt, a significant amount of familiarization and on-the-job training will be conducted at each FAA, but this type of training falls outside the realm of that sponsored by NAVCOMPT. The FAA's responsibilities concerning officially sponsored IDAFMS training are limited to advising the FIPC of initial and follow-on training requirements and ensuring that personnel who require training are scheduled expeditiously. [4:7]

Although not assigned responsibility within any NTP, private contractors play a major role in supporting the design, development, and administration of IDAFMS support training. Three contractors are involved in varying degrees with the project. SAI Comsystems, Inc. conducted a study and prepared the Analysis of Alternative Approaches, Methods, and Media for an IDAFIPS Training System which was utilized to determine the most appropriate manner to conduct user training for all IDAFIPS subsystems. It

also produced the IDAFIPS Master Training Plan discussed above. Westec Services, Inc. has performed a variety of services in support of the entire IDAFIPS project. It produced the regional I/IP for FAADCLANT, is currently conducting the FIPC/FAA study discussed in Chapter II, and is heavily engaged as a subcontractor in development of programs for both initial user and follow-on training. Arthur Young & Company has been contracted to develop the entire user training program including training objectives and plans, separate courses, lesson topic guides, student course material, and all support documentation for each course. Along with NAVCOMPTSSA and FIPC instructors, Arthur Young will conduct initial user training. Contract extension provisions allow the flexibility of continuing contractor training support throughout implementation at all fifteen FIPCs.

2. Planning Factors

Every NTP must be developed with consideration for the unique training requirements dictated by the nature of the project. These "factors" determine the type of training required, the delivery method most appropriate, specific training material and equipment requirements, variations in training for different groups, the requisite timing for specific courses, and the necessity for follow-on programs. If the overall training plan is to adequately

support the project, each factor must be considered carefully. Planning factors for IDAFMS fall into three basic categories: training elements, initial training, and follow-on training.

Training elements include the training program, the materials with which the program is conducted, and any equipment necessary to support the program. All IDAFMS training is developed in accordance with MIL-STD-1379B, the standard employed throughout DOD for contract training programs. These include very specific content and format guidelines for development of training courses and curriculum outlines, instructor guides for training courses, and student training course guides. All training materials are derived from technical documentation, manuals, interviews with subject matter experts, and analysis of job task data. Materials for initial training programs will give consideration to the financial management systems being phased out and to site unique characteristics; this helps to insure a smooth transition from the old to the new system. Training equipment will include terminals and printers which must be installed in a designated FIPC training space to facilitate laboratory instruction and practice. [4:9-10]

Initial training is defined as that training which all designated FIPC and FAA personnel will receive prior

to IDAFMS implementation. All such training must be completed between the time of hardware turnover from the contractor and the start of on-line operations. This limits the initial training period to a six week period as shown in Figure 12. This training will be conducted by training teams composed of contractor and NAVCOMPTSSA personnel and is oriented toward the experienced employee. [4:10]

Follow-on training consists of all training programs conducted after IDAFMS implementation at a specific FIPC. This training is the responsibility of the FIPC; however, supporting programs and materials will be provided by NAVCOMPTSSA. This training falls into three categories: replacement training, cross training, and refresher training. A heavy requirement for replacement training is envisioned due to the traditionally high turnover of technicians at the FIPC and FAA.

3. IDAFMS Training Requirements

Based on the planning factors noted above, the numerous requirements for a comprehensive training program are consolidated in a series of programs which can effectively support the requirements levied by IDAFMS implementation. These programs are time-phased and are reviewed in the general order in which each occurs during the implementation process.

Initial Visit Training is conducted at the FIPC site approximately twelve months prior to the scheduled hardware delivery date. This is an overview session for FIPC and FAA management and supervisory level personnel and is usually conducted over two days. The objective of the training is to familiarize these managers with basic IDAFIPS concepts, NAVCOMPTSSA organization and its role in system development, an overview of basic IDAFMS processes, plans for installation and implementation, and the near term impacts of implementation on the FIPC and its FAAs. [4:III-1]

Advanced training for designated FIPC personnel and DPC Site Managers or Site Analysts is conducted at NAVCOMPTSSA during a four week period approximately nine months prior to hardware delivery. The personnel trained in these sessions are accounting and disbursing supervisors from the FIPC and operations and systems development personnel from the DPC. Upon return to their activities, these personnel act as coordinators for the conversion and implementation process, provide training for FIPC systems accountants, and provide assistance to FAAs. [4:III-1]

FAA/FIPC Orientation training commences three months prior to hardware delivery. This one day session for managers from both the FIPC and FAA gives a systems

orientation and preview of IDAFMS processes and discusses the management level functional requirements levied by IDAFMS. The heart of this training is the discussion of IDAFMS system philosophy concerning the integrated data base operating in an on-line, interactive, transaction-driven mode. System capabilities are discussed in a level of detail appropriate to managers. This is the last formal training session prior to hardware delivery.

After hardware delivery, installation by the contractor and CDA installation specialists, and successful tests to validate proper performance, the major thrust of initial training can begin. Each of the next three courses will be administered several times during the forty-five day test and training period by separate teams of NAVCOMPTSSA and training contractor personnel. The expected number of iterations of each course and the total number of personnel in each category to be trained will vary significantly between FIPCs.

Management overview training will be conducted for major claimant personnel and any other management level employees who require a broad understanding of IDAFMS functions and requirements. This one day session translates the IDAFMS capabilities and management responsibilities presented during FAA/FIPC orientation to the actual operational procedures needed to utilize the system in an

effective manner. This training employs terminal equipment in the training laboratory to give students limited hands-on exposure to data input, system inquiry, and optional report generation. [4:III-3]

Disbursing supervisors and technicians who perform functions associated with the payment of dealer's bills, civilian payroll, and claims against the government will receive approximately thirty-two hours of instruction. This course provides disbursing personnel with an overview of IDAFMS and comprehensive instruction in using the system's capabilities to perform bill payment and related functions. The course is conducted through a combination of classroom lectures, demonstrations, and practical application in the training lab using terminals which interface with a training data base. The majority of available time is used in teaching students mechanized methods of processing payment vouchers into the system and the process of generating checks in payment of valid obligations. [4:III.A.5-3]

The largest single group to be trained during the forty-five day test and training period is composed of accounting supervisors and technicians at the FIPC and all supported FAAs. Due to the complexity of the accounting function and the wide variety of accounting applications in IDAFMS, this training is both longer and more critical than any other performed during

implementation. The accounting technician and supervisor course consists of approximately seventy-two hours of instruction. It provides an overview of the system to build on previous training, and utilizes the majority of available time to teach these employees effective performance of accounting functions with the system. The course is heavily weighted toward the application of IDAFMS processes in the laboratory environment. Students spend nearly thirty hours in the training laboratory learning how to process every type of accounting document, make inquiries of the data base, and obtain summary reports. Upon completion of the course, the technician or supervisor should be able to perform all requisite accounting functions through interaction with IDAFMS. [4:III.A.6-3]

The FIPC is currently responsible for post implementation training. There is a provision in the contract for development of training programs to establish a follow-on training course. The specific contents and emphasis of this course have not yet been finalized, and it is unknown whether the course will take the form of replacement or remedial training. In either case, the responsibility for administration of post implementation training programs will rest largely with the FIPC training coordinator. Support from the major claimants whose activities are serviced by the FIPC is a key factor in maintaining useful training

programs which will continue to fill the needs of the FIPC and, more importantly, its supported FAAs.

If truly beneficial training is to be realized, adequate training facilities and equipment are equal in importance to effective courseware. These factors are of particular importance in a program involving interaction with an automated system. The current plan for training facilities at each FIPC calls for the creation of a training laboratory and classroom to be employed throughout the implementation training phase; the primary major claimant served by each FIPC is responsible for ensuring creation of these facilities. Adequate space and classroom support equipment (desks, tables, chalkboards, etc.) are the claimant's responsibility. Terminals, telecommunication lines, printers, and all equipment required to tie into the host computer are NAVCOMPT's responsibility and are included in the regional I/IP. There is some question at this time whether terminals used for initial training will remain in place for follow-on training or will be relocated within the FIPC. In order to justify keeping terminals and supporting equipment at the training site, the demand for follow-on training at the FIPC must be high. Alternatives which provide feasible solutions to this dilemma are addressed in the next section.

C. AUTOMATION IN IDAFMS TRAINING

Chapter IV reviewed the utilization of computers in educational and training applications and suggested ways in which microcomputers can be employed throughout the IDAFMS network. The potential for including microcomputers within IDAFMS training programs is immense; however, this potential is explored only briefly in the primary study upon which training program development is based. The considerations for automated applications in IDAFMS training, many of which are not planned in current programs, are discussed below.

1. Training Methods and Media Study

The previous section describing IDAFMS implementation plans noted a contractor-produced study which analyzed various approaches, methods, and media considered for all IDAFIPS training programs. This study considered all traditional methods of training delivery (lecture, demonstration, self-direction, assigned readings), verbal interaction, and knowledge application methods for both initial and follow-on training. The study suggests that methods which include programmed instruction, class discussion, seminars for managers, lectures, and skill performance are most appropriate for IDAFIPS training. [21:4-16]

Various classes of media were also reviewed and analyzed including transient media (audio recordings,

slide programs, motion pictures, television); visual aids; print media; environmental media (trainer, simulator); and tutorial media (computer-assisted instruction, programmed texts). Tutorial media provides for the most effective learning because it permits the greatest amount of student involvement during the learning process. A high degree of individualization in the instruction is permitted because the student interacts with the instruction and achieves the objectives of the instruction at his or her own rate. The study concluded that: "a media mix of CAI, actual equipment, and adjunct materials such as user handbooks and off-line programmed instruction, can satisfy the IDAFIPS training requirements and learning algorithms." [21:4-30]

Having analyzed both methods and media for an effective training program, the study formulated various alternatives for selection of the most appropriate methods and media. Seven alternatives employing conventional (group paced) instruction, individualized (student paced) instruction, formal on-the-job training, and informal on-the-job training were evaluated for initial and follow-on training requirements. The preferred alternative, based on a set of selection criteria tailored to the needs of the IDAFIPS training system, is the initial use of conventional instruction followed by a phased transfer to individualized

instruction. This approach is necessitated because of the limited time available to develop individualized instruction programs (either CAI or manual) prior to initial training at the first few implementation sites. [21:5-20]

2. Computer Applications

The Methods and Media Study falls short of recommending specific methods of employing microcomputers in the training process. However, the methods and media recommended are easily performed in an automated environment using either the IDAFMS host with its terminal network or a microcomputer operating off-line. Each potential training approach considered by the study employs some type of performance training using IDAFMS terminal equipment. This training is absolutely essential to development of the ability to interact with the system. Both the disbursing and accounting technician and supervisor course curriculums are composed of lectures, demonstrations, and hands-on training in document processing. This mix of methods considers differences in preferred learning styles and provides adequate interface practice with IDAFMS hardware.

Under the present design, training laboratories at each FIPC will be supplied with several terminals, each linked to the host computer. A training data base under development by NAVCOMPTSSA will be employed to permit

students to gain access to the system, enter all appropriate document information, make corrections to documents failing validation, query the data base for specific document status or fund status, and see the results of their actions. The Burroughs terminals used throughout the system are severely limited in the amount of data that can be stored internally at any one time. The equivalent of four screens of data will completely fill all available temporary storage. As such, these terminals cannot be employed for any off-line training purposes. Additionally, the system software resident in the mainframe and the data provided in the training data base do not permit more sophisticated terminals to be used for training applications.

Although not possible under current hardware configurations, the potential exists for using Remote Batch Terminals, a Burroughs minicomputer, to house the training data base. This approach would permit usage of the training data base at the discretion of the local activity rather than at specified times determined by the FIPC. This is of particular importance for follow-on training where replacement, remedial, and cross training are required for FAA personnel on a continuing basis. The cost to bring these personnel to the FIPC for training on any regularly scheduled basis is expensive for the responsible activity (FAA or major claimant) and may often be untimely. By

placing the training data base at the local activity and providing the means for specified terminals to interact with the RBT, standard training programs developed by NAVCOMPTSSA can be employed when needed by the FAA. The FAA is no longer tied to the FIPC for its training support.

In a similar manner, creation of the micro-to-host link will permit employment of training programs by microcomputers at the FAA. Depending on the size of the data base, the technical characteristics of a specific microcomputer, and the software developed for the training applications discussed earlier, a student could feasibly employ a microcomputer as a stand-alone training device. This would provide even greater flexibility to the FAA in scheduling and administering training for its personnel during appropriate times and at the student's own pace. The microcomputer can additionally be employed in a wide range of training applications discussed earlier. In short, a complete training program encompassing all aspects of Navy financial management can be employed in a standardized approach if the appropriate software and communications capabilities are made available.

D. SUMMARY

The implementation of any automated financial management system is an extremely complex project. Realization of a successful implementation demands the utmost of analysis

prior to development of formal plans for hardware and software installation, system testing, and user training. The general and regionally specific I/IPs provide a detailed approach to the implementation process and consider all variables known to system developers and user activities. Undoubtedly, some unknown factors will impact on implementation at each FIPC.

Effective training is one of the key success factors for IDAFMS, both during implementation and throughout the life of the project. Initial and follow-on training programs currently included in the project should prove adequate to the initial needs of system users. Selective improvements in instructional methodology and training program content can lead to more effective results for users at all levels of Navy financial management. Critical considerations for the training process and recommendations for future action are discussed in Chapter VI.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION

Chapters I through V have provided a comprehensive overview of automated Navy financial management systems, the development of IDAFIPS and its supporting subsystems, the functions performed by IDAFMS, the implementation process for IDAFMS, and the potential employment of microcomputers in the IDAFMS network. Design and development of the entire IDAFIPS system have been accomplished in a deliberate, yet highly organized manner in order to meet all requirements set forth by NAVCOMPT directives and GAO guidelines. During this ten year period, advancements in technology have overshadowed our ability to design systems capable of exploiting modern computer hardware capabilities. Nevertheless, IDAFIPS promises to bring a level of sophistication to financial management never before enjoyed within the Navy. The reader should be fully appreciative of the improved management functions made possible by IDAFMS and the enhancement of IDAFMS' capabilities made possible by the microcomputer.

This chapter will offer the conclusions and recommendations arising from the research. Conclusions are based on the impressions gained from readings, interviews, observations, and comparisons made over the course of the thesis

process. Recommendations are made with the intent of improving the effectiveness of implementation training and the employment of IDAFMS by its users in the field and with the desire to positively influence further improvement in our methods of managing limited resources.

B. CONCLUSIONS

The primary conclusions arising from the analysis are offered in the next few paragraphs. Many supporting conclusions may be drawn from the chapters; each of these falls into one of the following major categories.

1. Concept Soundness

Throughout all discussions held with personnel at every level of Navy financial management, the single opinion universally held by all is that financial management systems employing integrated data bases are the the only practical means of efficiently managing Navy resources. No alternatives have been offered which can compare with the capabilities which an integrated system brings to its users. The growing need for information with which managers can control their resources demands that mass quantities of data be available for easy access by many different users. IDAFIPS will satisfy this need for financial managers at all levels in the Navy. It provides what Navy financial managers need now and has the potential to process quantities of data that far exceed initial

work load estimates. The systems' architecture developed by the design team has the flexibility to accommodate new developments in both hardware and software, and provisions for inclusion of future capabilities are included in the contracts with Burroughs. No better concept upon which to base a comprehensive financial management system has been developed to date.

2. Critcality of FAADCLANT Implementation

One of IDAFMS' major challenges is to build a following in the managers and supervisors who employ it at the FIPCs and FAAs. Like any new system which employs innovative technology, IDAFMS must face the critics who anxiously await its "opening performance". For this reason, the initial site implementation at FAADCLANT is extremely critical to the long term success of the project.

Actions taken by all parties to date point toward a smooth transition, but unknown factors will inevitably arise. The installation and implementation team's ability to manage these factors will ultimately determine how users view the system. Follow-on site implementations will undoubtedly be influenced by the lessons learned from FAADCLANT. What IDAFMS needs is an avid following of users at FAADCLANT and its supported FAAs who will relay their impressions to future implementation sites. Users anxious to receive the system will provide the

support and effort needed to make each implementation as smooth as possible.

3. Impact of Claimant Desires

The reality of the political process within governmental institutions must be accepted, even within Navy financial management. The entire IDAFIPS project is not exempt from political factors, and the desires of major claimants fall high on the list of issues which must be addressed by the Project Office. One can place little blame on each individual claimant; the systems currently in use provide required financial data in the format best suited to the claimant's needs. IDAFIPS does not promise to accommodate these needs. Standardization is the key to any automated system; as such, all individual claimant desires cannot and will not be met by IDAFIPS. Even so, political pressure will continue to be exerted throughout the implementation process. The claimants see themselves in somewhat of a separate chain of command concerning implementation of IDAFIPS. NAVCOMPT is not in their operational chain. Major issues which cannot be resolved within the financial management community may be addressed through the operational chain; resolution of such issues can delay implementation actions and adversely impact realization of a totally integrated network. For these reasons, the

major concerns voiced by claimants need to be addressed in a constructive manner at the project management level.

4. Growth in Microcomputer Usage

As discussed in Chapters IV and V, a microcomputer "explosion" is occurring throughout the Navy in much the same manner as in the private sector. Financial managers will continue to employ the microcomputer to assist in managing assets for which they are responsible. Regardless of the new capabilities made possible by IDAFMS, these managers are likely to increase their dependence on the microcomputer as the primary tool by which financial resources are managed. When the training opportunities made possible by the microcomputer are included, one can easily see that many managers will develop an increasing reliance on the microcomputer. This reliance needs to be acknowledged by IDAFIPS systems developers and employed to the advantage of users through development of interfaces between the system and the microcomputers in use at all activities in the financial reporting chain.

C. CRITICAL FACTORS AND RECOMMENDATIONS FOR TRAINING

No automated system as complex as IDAFMS can have any hope of success without a comprehensive training program as its foundation. Many factors critical to the success of the IDAFMS Master Training Plan have been noted in previous chapters and are well documented in both the

Navy Training Plan and the Methods and Media Study. Other studies currently underway will provide more information upon which the IDA Project Office, NAVCOMPTSSA, and the FIPCs can base future training programs. The most important of these factors are noted in the following paragraphs.

1. Time Constraints

This is probably the most critical factor for the initial implementation. All plans point to implementation starting 1 October, 1985, at FAADCLANT. This date must be met if the project is to retain credibility and have a reasonable expectation of acceptance throughout the network. As such, many of the training programs and enhancements desired by users and the IDA Project Office cannot be accommodated for the FAADCLANT implementation. All basic requirements for courses noted in Chapter V will be met, but these training programs will not have had the benefit of much "fine tuning" prior to actual use. After the initial implementation, trainers can seek feedback and alter future training programs as required.

2. Appreciation of FIPC/FAA Training Deficiencies

If implementation training at any site is to be effective, trainers and NAFC/NAVCOMPTSSA personnel must gain an appreciation for the training deficiencies present at that site. It is highly unlikely that the majority of technicians who require IDAFMS training at each site

are adequately prepared to master those skills taught during the limited time permitted for initial training. This is the case in most FIPCs and FAAs because technicians are already overcome with the complexities of interim automated systems. Training programs for new employees are limited almost entirely to on-the-job training administered by supervisors who may have limited knowledge of the system's capabilities and requirements. Technicians learn the rote steps necessary to perform standard tasks, but seldom understand the processing that occurs in the system. In the real world of the accounting or disbursing technician, management by exception is the rule. As a result, training programs go by the wayside or are administered haphazardly. This situation must be reversed if IDAFMS technicians are to operate the system efficiently.

3. Necessity for Baseline Training

The basic underlying cause of declining professional expertise at the FIPC and FAA stems from a lack of training in basic Navy accounting principles and standards. Most technicians and a fair number of entry-level supervisors have no formal training covering the NAVCOMPT manuals, basic Navy accounting principles, and the formulation of required financial reports. Old line accounting technicians with the knowledge and ability to conduct meaningful training programs are few in number, and most have been

attracted to larger activities. FAAs are particularly deficient if their workforce experiences a high turnover. Although this problem cannot fall strictly to the IDA Project Office, it should be seriously addressed throughout NAFC.

4. FIPC/FAA Environmental Factors

A common criticism levied at project sponsors and developers is that the field activity's personnel environment has not been adequately considered. FIPC/FAA personnel difficulties begin with the number of entry level technician positions at each activity. The skills required to qualify for these positions are minimal. As a result, those who can qualify for higher graded positions often apply and leave the organization after a short period. Turnover becomes a major problem for supervisors and managers who are attempting to manage the system with technicians who are new to the job, lack the professional knowledge required to be effective accounting technicians, and have had little formal training to improve their skills.

A wide spectrum of expertise exists in any single accounting or disbursing activity. This range of expertise leads to creation of "indispensable" workers unless the activity executes an aggressive training program on a continuing basis. Such a program is highly unlikely. These environmental factors must be considered by the Project

Office and training developers alike. Programs which can provide ongoing support to the activity facing high turnover of employees with limited skills must be provided for both replacement and remedial training.

5. NAVCOMPT/NAVCOMPTSSA/Contractor Interaction

As with any project, cooperation between all activities involved in development and implementation efforts is a prerequisite to success. This is particularly true when contractor assistance is required. The contractor may not hold the same allegiances to the project as the Project Office and CDA. This has the potential for disastrous results if contractor performance is not monitored closely and if a mutually supportive atmosphere does not exist between all parties involved. One need not look far to discover a case where contractor performance, although within contract specifications, did not meet the desires of the sponsor. The contractor likely has good intentions to perform in accordance with contract specifications. The failing is often due to our own inequities; all too often our procurement process fails to adequately identify the specific scope and quality of work required.

Having been forewarned by previous experience, it is incumbent on both the IDA Project Office and NAVCOMPTSSA to monitor contractor performance with an extremely

critical eye. Despite the excellent qualifications and reputation which the contractors supporting IDAFMS bring to the project, the final products of their efforts will only be as good as the oversight provided throughout the contract period. Considering the close working relationships that must be maintained between NAVCOMPTSSA and contractor personnel during training development and administration, the Project Office should play an active role in performing quality assurance of the programs and materials developed. Such oversight should be taken in a positive, constructive manner by all; mutual cooperation can only produce a more professional product of which all parties can be proud.

In selecting personnel to act as trainers alongside contractor personnel, only experienced accounting and disbursing technicians with extensive field experience should be utilized. Identification and selection of these personnel will require a concerted effort on the part of both the IDA Project Office and NAVCOMPTSSA. It is likely that the necessary talent cannot be spared from NAVCOMPTSSA design personnel; recruitment and/or detailing actions from other commands may be necessary. Regardless of their parent command, these personnel provide the technical expertise which is absolutely critical to the success of every training program. Without their background and

experience in the classroom, no program can produce the technicians needed to operate IDAFMS effectively.

6. Demonstration and Evaluation of Training Programs

The most critical portion of contractor performance requiring oversight by the IDA Project Office and NAVCOMPTSSA occurs during the first few iterations of each of the training courses. This is a particularly critical time in several respects, and personnel assets from NAFC and NAVCOMPTSSA alike will undoubtedly be stretched thin during the forty-five day system implementation/training period planned in the I/IP. Even so, it is absolutely imperative that each training course be given a thorough analysis prior to acceptance of any final product from the contractor. To do otherwise can have long term adverse effects on the entire implementation and follow-on training process.

Time should be made available to conduct a live instructional demonstration of each course by actual instructors prior to delivering that course to the intended recipients. Students for demonstration courses should be seasoned technicians and subject matter experts who can provide an objective, yet critical viewpoint concerning course content and delivery approach. Feedback from demonstrations can then be employed to make revisions prior to initial offerings at implementation sites. This feedback

is a critical element in testing the quality of contractor-produced programs and materials.

Following the delivery of initial course offerings at the first few implementation sites, further revisions and adjustments should be made until all course documentation reflects the changes made as a result of meaningful feedback. It is realized that a set of course documentation can never be perfect in every respect; however, the Project Office should require a "fine tuning" of all courseware prior to acceptance. Once course documentation is accepted, those who continue to conduct training programs must be charged with keeping materials up-to-date. This is a time consuming process, but one that is also critical to the continued success of training programs.

7. Post-Implementation Training Support

Once initial training has been accomplished at an implementation site, the current plan calls for development of follow-on training programs by NAVCOMPTSSA and administration of those programs by the FIPC. Unless active support is provided on a continuing basis from the Project Office, most FIPCs and FAAs will soon find themselves in a situation like the one now faced throughout Navy accounting and disbursing activities. That situation is as described above: ineffective or nonexistent training programs for new employees and those requiring remediation.

More support is needed if IDAFMS is going to continue to be utilized effectively by its users. In much the same way that the Navy trains its personnel to operate and maintain its weapons systems, those who utilize IDAFMS must be provided with training programs which continue throughout the life of the system. New employees will always require training; remedial and cross-training programs are needed if proficiency is to be maintained. The responsibility for developing and conducting these programs should not fall to the local activity. The FAA has neither the resources nor the expertise to perform such programs on a continuing basis. The problem is a very real one and has not yet been addressed in a manner which will produce the desired results.

The development of exportable training programs needs to be considered strongly if all FAAs are to be provided an equal degree of support. Those FAAs located in close proximity to the FIPC have little difficulty in sending personnel for training programs. Little or no additional cost in funding temporary additional duty travel accrues to the FAA. Those activities located some distance from the FIPC are at a distinct disadvantage in obtaining an equal amount of training for their personnel. Exportable training programs conducted either by training teams sent to designated FAAs or through

interactive CBI can be developed to help satisfy these requirements. As discussed in Chapter V, such programs could employ the training data base in conjunction with either the IDAFMS host or a microcomputer operating off-line. In either case, the interests of the FAA are served by training its personnel on-site in familiar surroundings.

D. IMPLEMENTATION AND OPERATIONAL RECOMMENDATIONS

The primary emphasis throughout the thesis has been the training program which supports IDAFMS. Opportunities for improving IDAFMS' effectiveness outside the training environment are explored in this section.

1. FIPC/FAA Study Findings

Certain recommendations not directly related to the training process are equally important to the success of the system. The first of these concerns employment of information gleaned from the FIPC/FAA Study discussed in Chapter II. The report has not been finalized at this time, but its contents will likely provide a wealth of information concerning the specific interactions between the FIPC and the FAA.

Of particular importance to the implementation and operation of IDAFMS is the reassignment of responsibilities formerly assigned to the FIPC in its role as the Authorization Accounting Activity. Under the concept of source document entry, the FAA must input all original

documentation to the system. Some FAAs currently perform this function under interim IDA systems. Others will likely experience a major increase in workload under IDAFMS.

Other factors which the FIPC/FAA Study should address include the employment of terminals and Remote Batch Terminals by both the FIPC and the FAA and the appropriate distribution of these assets within the region. Concern over adequate terminal assets at the FAAs was raised during site visits. The Study will hopefully address these and other issues pertinent to the FIPC/FAA working interface. Project managers need to consider these factors carefully.

2. Retention of NAVCOMPTSSA Personnel at FIPCs

All to often, the implementation of an automated financial management system is driven too literally by a schedule and not by the amount of progress made over a period of time. Project managers need to be sensitive to the needs of the FIPC and its supported FAAs in determining the amount of support required from NAVCOMPTSSA and contractor personnel. This sensitivity is needed throughout the implementation and initial operational periods. The CDA is frequently anxious to sever the ties of dependence developed by the activity during the conversion and implementation process. A schedule calls for a specified number of days of support, and the

implementation team is willing to spend no more with the user. As a result, users may not be fully prepared to operate and maintain the system. Such situations can lead to system malfunctions and unwarranted criticism by frustrated users.

Keeping in mind the criticality of initial implementations discussed above, the use of a flexible approach in scheduling the employment of NAVCOMPTSSA and contractor personnel at each of the implementation sites is strongly recommended. The measure of success through the IDAFMS network lies in the user's ability to operate the system as designed. Implementation scheduling is a secondary issue far outweighed by the importance of bringing the system on-line in an operational environment. A joint consensus of opinion concerning the FIPC's ability to operate the system should be reached prior to the termination of support during the installation, conversion, and initial operating phases at each implementation site.

3. Aggressive Pursuit of Micro-to-Host Link

Discussion throughout Chapters IV and V and the conclusions stated above all point to the feasibility of employing microcomputers as an integral part of the IDAFMS network. In order to capitalize on these capabilities and potential applications for which microcomputers are ideally suited, interface devices which permit transfer

of data between the Burroughs host and specific microcomputers at user activities must be developed, tested, and installed. This process can be a lengthy one, and users will not be receptive to long delays in obtaining such interface devices for their activities. Even so, the integrity of the data base must be maintained, and proper security measures must be included in system protocol. The IDA Project Office should institute actions to pursue development and testing of the hardware and software necessary to establish a viable micro-to-host link in the most expeditious means possible. Realization of this interface will open an entirely new realm of capabilites to Navy financial managers who utilize the IDAFIPS network.

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